

# Audubon

magazine

MAY-JUNE 1952

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# Audubon magazine

Volume 54 Number 3

Formerly BIRD-LORE

PUBLISHED BY THE NATIONAL AUDUBON SOCIETY

*A bimonthly devoted to the protection and preservation of our native wildlife.  
Fifty-fourth year of continuous publication*

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## Letters

### White Squirrel Is Boarder

I enclose a picture of a white squirrel which has been visiting my bird feeding station for about a year. It is not a pure albino as its eyes are dark. In addition to this unusual animal, some 18 or 19 species of birds visit my station on the best days.



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Elberon, New Jersey

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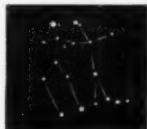
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Any time members and friends of the National Audubon Society wish to go birding on my land just south of Keeseville, New York, I shall be glad to have them do so. Most of the trees covering the land are white pines that have come up in the last 12 years. Alders border the stream that travels through my land and drains Kennan's Pond. Unfortunately there are no arrangements for overnight, except for primitive tenting, but there are cabins a mile or so away.

RUTH BISHOP

Schenectady, New York

### Bird-Study Courses At Home

In reply to the letter from Mrs. Collins (p. 3, January-February 1952 issue of *Audubon Magazine*) asking about home study courses in ornithology, I hope the following information will be helpful.

Twenty-five cents mailed to Office of the Secretary, National University Extension Association, Bloomington, Illinois, will bring you a copy of their *Guide to Correspondence Study*. This publication lists the courses offered by 53 accredited member colleges and universities. Also included is a list of addresses of each school, a table of fees and credit allowed, and other useful information.

The 1949 edition, the latest I have, lists bird study courses from Louisiana State University, Oregon System of Higher Education, and Pennsylvania State College. Also listed is a course in conservation of wildlife from the University of Missouri.

HENRY C. KYLLINGSTAD

Brigham City, Utah

### The Hawk And The Rat

Here is a kind word for a Cooper's hawk!

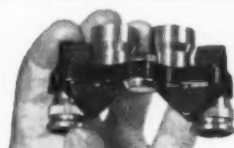
The afternoon of March 13 I stepped out to my rubbish cans that are housed in a small palisade yard that serves nicely to keep the dogs out and the rats and cans safe. There was a heavy flapping beyond the fence, which I took to mean that one of my neighbor's hens was out

*Continued on Page 142*

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## **The Hawk and the Rat**

*Continued from Page 140*

of bounds until I saw something brown fly into a young apple tree by my woodpile. I found myself staring squarely into the eyes of an immature Cooper's hawk, only eight feet away and just my level. Without moving a feather, he sat for a full half minute and stared back at me, slightly over his shoulder. His tail feathers were oddly bedraggled from the wet snow on which he had been sitting. Then he took off through the Scotch pines up the drive and into the woods.

I immediately looked to see what he had been up to behind the yard, and found the hinder half of a large rat at which I had interrupted him. And this for his dinner in spite of 15 young hens in a little yard not 20 feet away on my neighbor's side, while my own dozen and a half were scratching equally unperturbed 50 feet off on my side of the fence! Is this something new in Cooper's hawks, or is original sin not quite so universal as I had imagined?

In any case, we have since felt much easier about seeing him as often as we have this spring and hope his taste becomes a habit.

Incidentally, I hope all copies of your magazine circulate as widely and long as ours do—from us to grandparents to assorted small cousins, our cleaning woman, and back to us again.

MRS. FREDERICK J. STEINHARDT

Mamaroneck, N. Y.

## **Apple Seeds for Grosbeaks**

In the January-February 1951 issue of *Audubon Magazine* one of your readers asks what to feed evening grosbeaks. In light of the fact that this is a rather common and recurrent question I should like to pass on the following information.

Several observers in Maine have reported that this species will readily accept apple seed as a substitute for sunflower seed. These people secure this seed from canning factories. If any feeding station operator lives in the vicinity of such canning factories, it might well pay to look into this new source of food. If this waste product could be processed and sold by such factories at a reasonable price, it might prove to be the solution to satisfying the greedy and expensive appetite of this species.

CHRISTOPHER M. PACKARD

Brunswick, Maine

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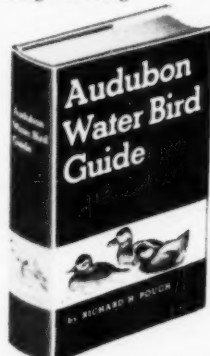


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Airplane spraying DDT to control tussock moths in a northern Idaho forest. Photograph courtesy U.S. Department of Agriculture, Bureau of Entomology and Plant Quarantine.

# Wildlife IN A CHEMICAL WORLD

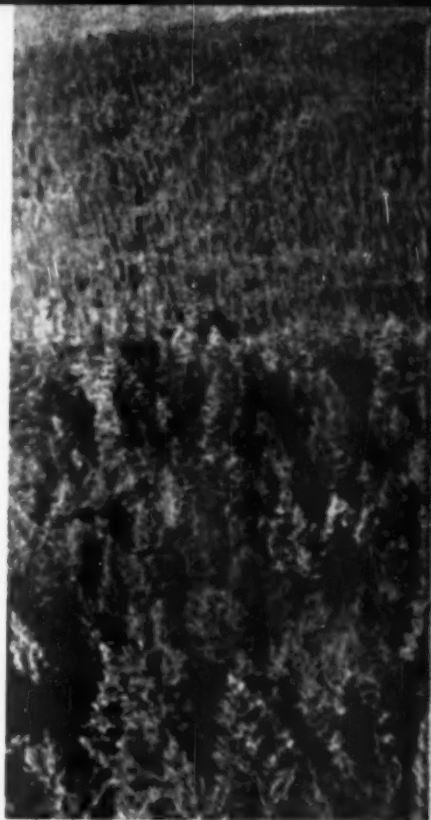
By J. P. Linduska

OF THE many great technological discoveries made during World War II, probably none has become so widely known or received such wide acclaim as DDT. Even in remote sections of South America, Africa, and islands in the Pacific, natives who never heard of or experienced results of research in radar, nuclear physics, and other fields have learned to know well the performance of this miracle insecticide. Some members of savage tribes are limited in their English vocabulary to the three-

letter abbreviation of this compound, and at least one grateful father in the jungles of Surinam (Dutch Guiana) named his new-born son in recognition of this compound which provided him with his first experience of a mosquito-free existence. To approximate the native pronunciation, this Djoeka boy was called "Daydaytay."

In the developed parts of the world, DDT has found wide application in the solution of insect problems. Its principal wartime use in the combat of insect-disease vectors has grown to include a wide variety of other pests of agriculture and forestry. Literally hundreds of millions of acres of farmland, wilderness areas, and marshland are now subject to routine DDT treatment for the suppression of one or another of the insect pests.

Bob-white quail are far less resistant to DDT poisoning than mourning doves, starlings, mallards and pintail ducks. Photograph by John H. Gerard.







Long before DDT had hit the drug-counters and store-shelves, stories had reached the public of its tremendous insecticidal properties. As one of the confidential tools of the military it had performed miracles.

In the Pacific, malaria, more than opposing armies, had been the number one enemy. But casualties from this disease dropped to the near-zero point with the coming of DDT. About one ounce of the material to an acre of water was found to clean up all

**At Beltsville, Maryland, an aerial spray of DDT at the rate of five pounds an acre reduced the prairie warbler population by 93 per cent, two days after spraying. Photograph by Hugh M. Halliday.**





anopheline mosquitoes which transmit malaria. Typhus, too, was dropped from the ranks of top-flight military problems when DDT came forth as a sure killer of the body lice that transmit this dread disease.

These and similar accomplishments of the wonder chemical were welcome news to a nation at war. But what about the near-indiscriminate peacetime use that has been made of the material since its release to the public in 1945? True, many insect problems of long standing have been effectively handled with DDT and companion products. However, DDT and its newer counterparts operate not as a rapier pointed at a specific insect but more as a scythe mowing down beneficial forms along with the pest.

Because of the remarkable stability of DDT, dangers from long-term accumulation may project final judgment well into the future. In the meantime, however, intensive studies by many agencies and individuals have revealed the more immediate dangers and limitations of the compound as far as wild forms are concerned.

It is not a simple matter to set forth the circumstances under which DDT and similar poisons may be safely employed. Neither is it possible to describe briefly and specifically the conditions under which they may involve conspicuous hazards. Here are some of the reasons why:

In the laboratory, carefully controlled tests have shown that many factors can regulate the effects of DDT. In the case of quail, for instance, workers at the Fish and Wildlife Service's Patuxent Research Refuge in Maryland have found that administration of the product in oil increases the toxicity threefold over the dry crystalline powder. Among fish, too, the manner in which the poison is compounded is an item to be considered. For this group, oil solutions and emulsions are more of a hazard than wettable powder.

The age of individuals conditions their

**Birds and mammals are less susceptible to DDT poisoning than fishes. Photograph of raccoon by Wilford L. Miller.**



### **A Statement About Insecticides**

The National Audubon Society hopes that the readers of *Audubon Magazine* will give thoughtful consideration to the facts revealed in this important article by Dr. Linduska, who is chief of the Bureau of Game Management of the Fish and Wildlife Service.

The Society believes that too little attention has been paid to the biological consequences of widespread use of powerful insecticides. Because there is no regulation of the application of insecticides, many operators use dosages of greater potency than is needed to accomplish the objective.

Despite well-publicized claims that certain minimum applications of insecticides will not harm birdlife, for example, it is generally recognized that any dosage affects the ecology of an area and that forms such as fish, reptiles and amphibians are killed by even light concentrations of DDT and other similar products. Also, the decimation of their insect food can eliminate certain birds as surely as if they had been DDT-poisoned or shot with a gun.

It is desirable to publicize the fact that DDT in an oil solution is much more of a hazard to

wildlife than when compounded with dry crystalline powder, and that, when possible, insecticide applications should not be made during the nesting season of birds because of the particularly high vulnerability of young birds to poisoning.

The super bug-killers now being developed hold potential hazards for wildlife much greater than anything experienced to date. Audubon members should be alert to determine what large-scale uses of insecticides are being made in their vicinities, and whether the potency of the dosage is the minimum amount that will produce the sought-after results. It is also important that surveys of wildlife populations be made both before and several times after the applications. If serious harm to wildlife results from insecticide use, it is a matter of public concern and one that needs to be brought into the open with whatever factual evidence is available.

(Duplicated copies of both installments of Dr. Linduska's article are now available at 10¢ each. Audubon members may wish to send them to newspaper editors, public libraries, and agencies engaged in the use of insecticides.)

susceptibility to DDT poisoning, and in aquaria tests young fish are killed by lesser dosages than adults of the same species. Young birds, also, are more vulnerable than adults, and in control operations nestling birds may suffer losses under circumstances that have scant effect on the adults.

Studies both in the field and laboratory have shown that general groups of wildlife react differently to insecticides. Mammals are the most resistant to poisoning; birds come next in the order of increasing susceptibility, followed by amphibians and reptiles; and fish show the least resistance of all these broad groups.

To complicate matters further, different species within the same group show a wide range of response to insecticides. Among birds, for instance, the starling, and mallard and pintail ducks, are all more than three times as resistant to DDT as quail. And at the Alabama Cooperative Wildlife Research Unit, where a number of the new insecticides are under study, biologists found that doves, also, could withstand three times as much of the new poisons as could the bob-white.

Fish, living as they do in a restricted medium, are conditioned in additional ways in their response to DDT. Individuals on a plentiful diet are less affected than others on slim rations. And characteristics of the

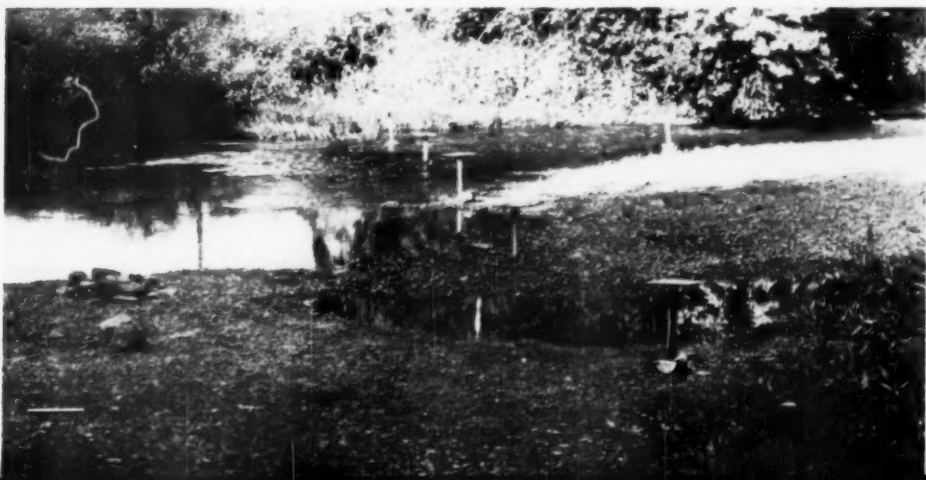
water have other effects, with warm temperatures, reduced amounts of oxygen, and soft water all enhancing the potency and activity of the poison.

It is the many variables such as these that make it difficult to generalize on the wildlife hazards of insect control. And even after the answers from detailed investigations are in, some unexpected factor can appear later to add new confusion to the picture. Such a situation occurred in the course of a study to determine the hazards to fresh-water fish of aerial spraying with DDT.

In West Virginia a representative small-mouth bass stream was sprayed experimentally for two successive years. In each case DDT at the rate of one pound per acre was applied from a plane to a one-mile length of the stream. Biologists who followed up the investigation found that results were fairly comparable and a small but consistent number of warm-water fish were killed in both tests.

Then in 1947 some of these same biologists were assigned as part of a team to work in Teton National Forest in Wyoming where experiments were under way to test the value of DDT for pine beetle control. Rock Creek, a productive trout stream, bordered one of the experimental plots scheduled to receive five pounds of

Series of filter papers on posts to measure the amount of DDT reaching the ground from an aerial spray. About 25 per cent to 33 per cent of DDT released from the airplane reached ground level. Photograph courtesy of U.S. Department of Agriculture, Bureau of Entomology and Plant Quarantine.



DDT per acre. This dosage was to be applied in two equal amounts at an interval of one week.

Based on their West Virginia experiments involving a one-pound-per-acre dosage, the biologists predicted a complete kill-out of fish in the Teton Forest experiment where five times this amount was involved. But nothing, or practically nothing, happened. In this well-populated stream only 11 dead cutthroat trout were found when past experiences dictated that there should have been hundreds.

In the laboratory where conditions could be standardized and controlled, some explanations came to light. First of all, it was found that different kinds of fish vary widely in their susceptibility to DDT, and trout proved to be considerably more resistant than most warm-water species. While this in itself helped to explain the marked difference in effects in the two areas, it seemed likely that other factors were involved. There was one noticeable difference between the two situations. The West Virginia stream was clear and fast running with a boulder bottom. Rock Creek in the section studied contained 34 beaver dams and the water was muddy from the continual activity of these animals. Would clarity of the water have any effect?

A series of aquaria were set up, some containing a layer of mud, others holding only clear water. Three species of trout were introduced into each aquarium and DDT in identical amounts was applied. In the several aquaria containing only clear water, losses of trout ranged from 84 to 100 per cent. But in those aquaria having a bottom layer of mud the most that were killed was 39 per cent and brook trout were not affected at all! It has since been shown that DDT enters into a loose physical bond with mud particles and its toxicity or availability in this condition is much reduced.

Other investigations have shown that the insecticide hazards in aquatic areas need not concern only a direct killing of fish. Heavy reductions of insect life generally occur with control operations and fish, being restricted in their movements, are espe-

cially sensitive to shortages in the supply of aquatic insects. In northern Idaho where one pound of DDT per acre was applied to nearly half a million acres of forest for control of an important pest of Douglas fir, the direct kill of fish was slight. But in some large watersheds, aquatic insects were sharply reduced and this principal fish

**Essex County (New Jersey) test spraying of elm trees to control bark beetles. Photograph by Roche.**



food continued in short supply for more than two years following the operation.

Birds and mammals are less susceptible to DDT poisoning than are fishes and other cold-blooded animals. In a number of experimental tests in forest areas, birds were unaffected by a single aerial application of DDT at the rate of one pound per acre. Although the general insect population was sharply reduced in nearly all cases, recovery of numbers was rapid, and there was no evidence that the temporary reduction



**An aerial spray of DDT at a rate of five pounds an acre in the Beltsville experiment, reduced the Maryland yellow-throat population by 63 per cent in the first 24 hours after spraying. Photograph by Allan D. Cruickshank.**

was of any real consequence to birds. Development and survival of nestling young appeared to be normal at this dosage.

Observations on birds in connection with large-scale operations have been consistent with the findings on experimental plots. In 1945 the Ontario Department of Lands and Forests, Canada, treated more than 60,000 acres at the rate of one pound of DDT per acre for control of the spruce budworm. Intensive studies of birds were conducted on three plots in the sprayed area and on one outside the treated area. Four birds, two of which subsequently died, were found with symptoms of DDT poisoning. Normal development of young was observed in several nests, and no measurable change in populations of adult birds was noted.

**Salamanders and other cold-blooded animals are, at times, highly susceptible to DDT poisoning. Photograph of Jefferson's salamander by Hal H. Harrison.**



In May and June 1947 over 400,000 acres of forest land in northern Idaho were treated for control of the Douglas fir tussock moth. DDT in oil was applied by planes at a dosage of one pound of the toxicant per acre. Detailed studies indicated that the spraying had no apparent effect on a high bird population, which included 44 species. Counts taken after the spraying showed a decline in numbers of 9.5 per cent, compared with 10.6 per cent in a check area. The slight decline in both areas was believed due to some individuals having completed nesting. Bird censuses accounted for practically all the original individuals throughout the study, and numerous nests and family groups appeared unaffected.

There have been few observations to indicate the effects of aerial applications with intermediate dosages of two to four pounds of DDT per acre. With five-pound-per-acre aerial applications, however, marked kills have resulted. In Lackawanna County, Pennsylvania, a test area of 600 acres was sprayed experimentally from the air with five pounds per acre of DDT in oil. Intensive counts of songbirds were made before and following the spraying on a central tract of 40 acres. Before application of the insecticide the population was 3.2 birds per acre or 128 for the 40-acre study plot. On the third day following spraying, only two birds could be found on the area, and in two weeks the numbers had recovered to 20 birds on the unit or about one-sixth of the pre-spray count. In the following year the population had recovered further to about 85 per cent of what was present before spraying.

A second test at the high dosage rate of five pounds of DDT per acre produced similar results. At the Agricultural Research Center, Beltsville, Maryland, a 90-acre tract of scrub and sapling growth was sprayed by plane in an experimental effort to measure the consequences to insect populations and birds. The effects on birdlife were apparent within 24 hours, and although an extremely dense undergrowth impeded the search, seven individuals with

*Continued on Page 190*

# ABOUT *Edwin Way Teale*

All photographs by Edwin Way Teale

By John Kieran

**I**NSECTS lead remarkable lives and so do some of the men who study them and write about them. Not that Edwin Way Teale confines himself to the specific field of entomology, but as an author-naturalist he first rose to fame through his intimate knowledge of (and photographs of) those "armored exoskeletons" that, according to some dismal scientists, in the long run will defeat the human race and inherit the earth. How did Edwin Way Teale get that way? What made him, at what proved to be the turning point in his career, pry into the private lives of insects that he found in his backyard? He says it was the economic crash of 1929 *et seq.*, the Great Depression. We'll see about that.

Edwin Way Teale was born in Joliet, Illinois, June 2, 1899. He led the normal home and school life of the boys of that section except that he had one advantage over the neighbor's children; his grandfather owned a farm in the sand dune country of northern Indiana and whenever the boy wasn't in school he was on his grandfather's farm. There he learned to love the outdoors and began to display a deep interest in wildlife. His grandfather paid him five cents a dozen for what mice he could trap in the granary. He dissected a mouse on his own time to learn something about its anatomy. He picked strawberries at four cents a box and earned money enough to buy a camera with which he took his first pictures of birds, flowers and insects. The only thing that cut into his pursuit of knowledge of wildlife was a great interest in gliders. Aviation was in its infancy. Airplanes were most expensive but gliders could be made cheaply enough by a boy on

a farm. Young Ed Teale made one glider after another, testing them by launching himself and glider from roofs of chicken coops, corn cribs and such places. He worked up to a glider with a 24-foot span that was to be pulled into the wind by one of his farm friends, an amiable horse. He says—Mr. Teale, not the horse—that the glider actually left the ground with him aboard before it crashed and ended its career. It also ended E. W. Teale's career as a glider pilot, though he later wrote a book about that branch of aviation. It was his first book, published in 1930. The title was "The Book of Gliders" and the author is under the impression that it was the first book on soaring and gliding to be published in this country.

On being graduated from Joliet High School, Edwin Way Teale went off to college. He briefly tried the University of Illinois and then switched to Earlham College at Richmond, Indiana, from which institution he was graduated with an A.B. in 1922. He became a teacher of English and Public Speaking at Friends University, Wichita, Kansas, and while there he came up with a lucrative idea. One of the popular syndicated columnists of that time was Dr. Frank Crane, whose daily "essays" of the uplift type were widely printed in newspapers across the country. Ed Teale wrote to Dr. Crane and offered to help him get out his daily column by suggesting topics, quotations, general ideas and particular treatment. He sent samples. Dr. Crane liked the samples and for years thereafter Edwin Way Teale did considerable work for the popular columnist. He received money for the column contributions, but no credit. However, it stirred him to giving up teaching to try a writing career.

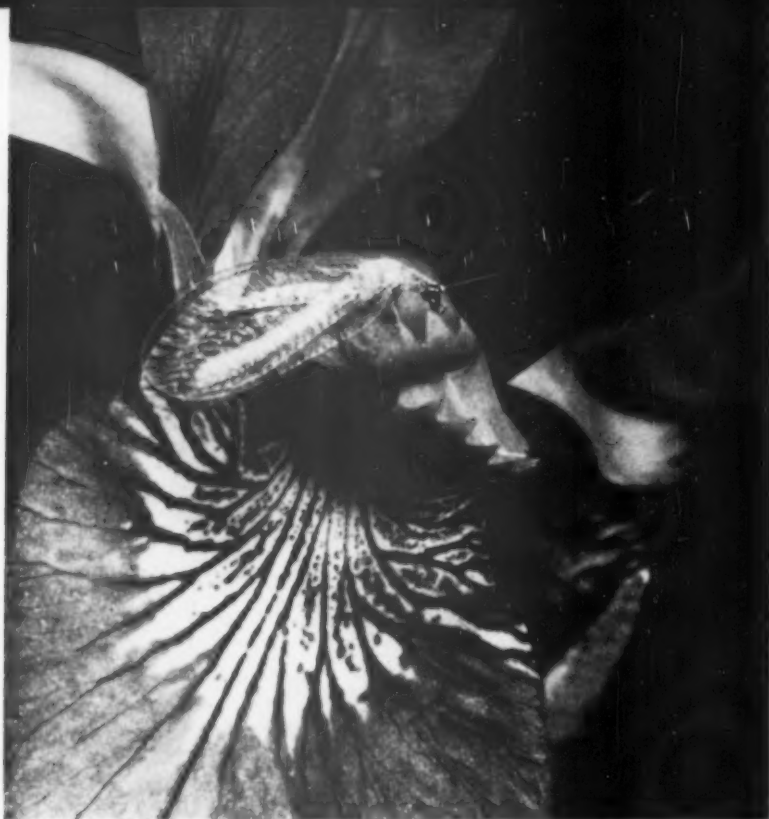




Edwin Way Teale watching a praying mantis whose eyes, he discovered, are green in daylight, brown at night. Mr. Teale explains this phenomenon in his book, "Near Horizons."

In 1921 he came to New York to pursue the literary life and nearly starved to death. He went from one magazine office to another looking for work and getting nothing, not even encouragement. He was so tired one day that he fell asleep in the waiting room of the *New Republic Magazine*. Finally he landed a staff job with *Popular Science Monthly*, doing all sorts of work including stunt stories like going up in an autogiro and down in a submarine. He

found time to attend Columbia University where he won his master's degree in 1926. He had a narrow escape from becoming a newspaperman. He was to replace an editorial writer on the *Columbus (Ohio) Dispatch* when that writer quit to become secretary to the Governor of Ohio. However, this particular "Governor of Ohio" was only a prospective Governor. He was running for office at that time. He didn't run fast enough. The editorial writer who had



The delicacy of a lacewing fly is revealed in one of Edwin Way Teale's superb insect photographs.

expected to become his secretary did not resign from the *Columbus (Ohio) Dispatch*. Our hero continued his steady output of stories for *Popular Science Monthly*.

Then came the business collapse, the economic crash of 1929—the Great Depression. By that time Edwin Way Teale had become a skilled writer and an expert photographer. He was also a persistent and enthusiastic naturalist. Nothing would have suited him better than to go on museum expeditions to Africa to photograph the animals there and write stories about them. Or to go to China or Australia in quest of birds of strange hues and curious habits. He had dreamed of those things. But the Depression woke him up. He was down to hard pan. He had to work with what was at hand. And what do we find at hand wherever we live, inside the house and out? Insects! Often we find too many of them. But Edwin Way Teale never found too many

to suit his tastes. Moreover, they fitted a depression budget. A man didn't need to pay his models or spend railroad fare to come upon them. They were right in the house or the backyard. They weren't strictly seasonal like the flowers or largely migratory like the birds. You could find some insects at any time of year and most of them led astounding lives. A man who lives a double life is considered an odd fellow. An insect that leads a triple life is quite ordinary in its own sphere.

It so happened that a publisher was interested in a luxury book for the trout-fishing trade and an expert on "dry flies" was preparing it. Edwin Way Teale, who

→ The eyes of this robber fly have more than 4,000 separate lenses. By replacing the Tessar lens on his Zeiss Ideal B camera with a one-inch focal length movie lens, Mr. Teale gets magnified photographs of insects which look as though they were taken through a microscope.







Mr. Teale in Florida (upper) watches ring-billed gulls. In his "insect garden" at Baldwin, Long Island (lower), he studied and photographed insects for 15 years.



In his book, "Grassroot Jungles," Mr. Teale says that the polyphemus moth is named for the mythical Sicilian giant, Polyphemus, of Homer's *Odyssey*. The polyphemus is appropriately named because it is the giant of American moths with a wingspread of five inches.

by this time had made himself known in a mild way for his wildlife stories and photography, was called in to submit some of his insect photographs for possible use in the "dry fly" volume. The editor was so impressed by Teale's photographs and knowledge of insects that another book was suggested on the spot with Edwin Way Teale as author and illustrator with photographs. "Grassroot Jungles" was the result, and the author was definitely launched on a career that has brought him international distinction in a field to which he has contributed a notable amount of fine writing based on solid science.

"Grassroot Jungles" was published in 1937. Its immediate success naturally encouraged Edwin Way Teale to continue as a writer-naturalist, enlarging his field as he went along. By 1941 he was so well established and accepted that he was able to give up his job as staff writer for *Popular Science Monthly* and rely entirely on his nature writings to keep the wolf from the door. Now he bears his blushing honors thick upon him. He is the author of "The Golden Throng," "Near Horizons," "Dune Boy," "The Lost Woods," "Days Without Time," and his (latest) "North With the Spring," in preparation for which he made a 17,000-mile journey by car, boat, plane and Shank's mare with binoculars, microscope and fountain pen ever on the alert.

To catalogue all the accomplishments of his career to date and the many distinctions that have been thrust upon him is impossible here. His remarkable photographs have been exhibited in cities all over the world. His books have been printed in Swedish, Finnish, French, Spanish and Braille. He is an Associate of the Royal Photographic Society of London, a Fellow of the New York Academy of Science, a past president of the New York Entomological Society, the Brooklyn Entomological Society and the American Nature Study Society.

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# NEW HORIZONS

By Guy Emerson

NEW styles in words come and go almost as rapidly as styles in women's hats. "Know-how" is one of the most recent crop. In the world of natural history about 10 years ago, the word ecology began to dominate the speech of scientist and layman alike. I am going to suggest that the word has been used so often as to become of rather slight significance. It may be possible to inject into it a measure of deeper meaning.

Ecology, which came to this country as a science some 50 years ago, means the biological approach to an organism in relation to its environment. Thus the scientific ornithologist will say to his students: "It is not enough to look at birds, to identify them, and to listen to their songs. You must realize that they are an integral part of nature. They fly, but they are tied to the earth by their need for food. Birds in relation to soil, trees and shrubs, water, air—that is your organic ecological problem for study."

That is ecology in relation to birds. But I want to present it for a moment in relation to men and women. We have said that ecology deals with organisms in their environments. Now, what is an environment? Says Webster's: "the aggregate of all the external conditions and influences affecting the life and development of an organism." That is a broad and interesting definition, "all the external conditions and influ-

ences . . ." This leads to one of the most important mind-stretching concepts of modern philosophy.

In his great book, "Morality and Religion," Henri Bergson gives new scope and horizon to the mind and spirit of man. Says he, (p. 246) "People are never tired of saying that man is but a minute speck on the face of the earth, the earth a speck in the universe. Yet even physically, man is far from merely occupying the tiny space allotted to him . . . For if our body is the matter to which our consciousness applies itself, it (i.e. our "body") is coextensive with our consciousness, it comprises all we perceive, it reaches to the stars." And again, (p. 247) "We are really present in everything we perceive."

It seems to me that is a magnificent concept of man in relation to his true environment. Let us apply it to the usual current and often highly specialized concept of the natural sciences. I will take my own case for example. Up until comparatively few years ago, my chief outdoor interest, aside from the pure beauty and wonder of nature, and being out-of-doors on foot as much as possible, was in birds. As a boy I was influenced by a few fine ornithologists in Boston who happened to have little interest in any other branch of natural history. Only gradually did I come to know more about flowers and trees and finally butterflies and other creatures.

Oddly enough, from college days on I



Guy Emerson is an experienced field ornithologist and has identified almost every species of bird occurring in the United States. Many of his bird-watching expeditions have been combined with business trips. Some of those experiences are related in an article, "The Lure of the List," which appeared in the January-February 1940 issue of *Bird Lore*, now *Audubon Magazine*.

Mr. Emerson's interest in the outdoor world has broadened through the years, as this article indicates. His zeal for conservation has been unflagging and the National Audubon Society is fortunate and grateful that this public-spirited leader has devoted so much time and effort, as a member of the board of directors and an officer of the Society, to advancing the Audubon cause.

# IN ECOLOGY

had been a constant reader in astronomy, and yet I had never consciously realized that stars and birds were part of a single great whole. They were for me in separate sealed compartments.

Gradually, in recent years, I have come to feel the oneness of the universe, and I can bear witness that this broadening viewpoint has vastly increased my interest and enjoyment of all the special subdivisions of the world we live in. I have suggested to some of my associates in the National Audubon Society that this venture of horizon-broadening is a fascinating one, that we should set before our large membership the idea that ecology for us means not merely birds and the earth, and growing things upon the earth, but includes the vast oceans around us which occupy perhaps three-quarters of the earth's surface, and includes also the skies above us and the vast galaxies therein: the immense laboratory in which our world was made and in which other worlds are coming into being and passing into oblivion. "It reaches to the stars."

Such a concept cannot be developed overnight. It must be given a chance to grow. A few books have appeared recently which contribute much toward broadening these new horizons. The first I need hardly more than refer to, so well has it become known during the past year. It is Rachel Carson's "The Sea Around Us" (Oxford University Press). This beautifully written book is a truly thrilling introduction not only to the oceans, the creatures living in the oceans, the forces controlling the oceans, but also a splendid primer of the geology to which oceanography is so closely related. "The Sea Around Us" takes a narrow land-bound birdman into great new regions of interest.

Another remarkable recent book is Fred Hoyle's "The Nature of the Universe" (Harper and Brothers). Originally prepared for a series of talks over the British

Broadcasting System, the text is brief and vivid. Not since Jeans and Eddington has anyone caught the essence of the stupendous galactic processes as well as Hoyle. The story moves on a gigantic stage, with breath-taking speed. For drama and mystery, it beats any "western" or detective-story ever written.

What I have said applies to the first six chapters of the book. I cannot refrain from cautioning readers of Hoyle's minor masterpiece that he was moved, in my judgment unfortunately, to add a seventh chapter, on his concept of religion. It is a sad case of anti-climax. Prof. Hoyle's amazing wandering among the galaxies gives him no special standing as an interpreter of divinity. Perhaps the lesson from this should be that in the process of broadening our environment, our interest and vision should stretch to the stars, but we should not presume, as naturalists, to storm the gates of heaven.

A third book of great value in enlarging the ecological view is Marston Bates' "The Nature of Natural History" (Charles Scribner's Sons). This volume is in the class with the two already mentioned in its admirable clarity of expression and readability. I would venture to say that Bates has distilled into less than 300 pages more elementary information as to just what natural history is, its scope, nomenclature and basic functioning, than has ever before been presented in our language. This book also contains an admirable selected bibliography with the aid of which the reader can supplement the all too limited suggestions in the present article.

These three modern and readily available books cannot fail to bring to any careful reader not only the deepest kind of pleasure, but also the beginnings of a new and thrilling concept of our human environment.

Here is the "open sesame" to new horizons in ecology.





"One class of youngsters follows another through the sanctuary." Photograph by Arthur Barr.

"Mrs. Stultz and Mrs. Woods have developed a plan which prepares children for sanctuary visits." Photograph of Mrs. Woods with children inside of museum (left) by Arthur Barr, (right) by R. H. Dill.



"The Museum is the center for a program that spreads over more than 300 acres of sanctuary land." Photograph by R. H. Dill.

# BIG CITY SANCTUARY

By Helen Gere Cruickshank

LESS than 50 miles from the coast, the San Gabriel Mountains rise in a mighty barrier to more than 10,000 feet. Flowing down the mountain slopes and across the plain to the sea are the short Los Angeles and San Gabriel Rivers, sometimes dry as talcum powder and occasion-

ally waking into wild and devastating floods.

Between the Pacific and the abrupt slopes of the mountains lies Los Angeles, our third largest city. Though only third in size, it stretches 44 miles one way and 25 the other, occupying the largest land area of any city in the United States. To stand on a high place and look across the multitude of buildings lined up, row on row like great regiments that finally fade out in the mists of the distance, the city seems endless. One has the same feeling when it is necessary to drive from a point on one side of the city to another on the opposite side.

In Los Angeles 42 per cent of the people of all California are concentrated. Its population increased 1535.7 per cent between 1900 and 1940. In the last 10 years alone the city has been swollen by more than a million new inhabitants. And still the city continues to grow with the new people filling in any open place they can find.

In this teeming city with great distances often lying between home and undeveloped country areas, one's dependence on the earth and its bounty are likely to be forgotten or unknown. How can urban people filling so great an area ever gain a sense of their birthright in and responsibility to the





soil and water and air of this earth? How can they have any conception of the meaning of conservation and its effect on their lives and the lives of future generations? How can they develop wisdom in the planning for the future of their precarious water supply, for flood control, for erosion prevention and the future of their food production? And how can they become aware of the beauty and wonder of nature in all its many phases? To many a harassed person who cherishes memories of serene, wonder-filled days in the open, that last need may seem of foremost importance in this present unrestful world.

Los Angeles is reaching for answers to these questions in many sound and constructive ways that other cities may well follow. But of all its programs of civic planning, none impressed me as did the San Gabriel River Wildlife Sanctuary administered by the National Audubon Society where a remarkable program for children and adults is carried on by two extremely competent and dedicated leaders,

Mrs. Alma Stultz and Mrs. Gertrude Woods.

It was late March when I joined Allan, my husband, in Los Angeles. Knowing how impatiently he had awaited my arrival with the cameras so he could go north to the wild sea cliffs of the San Lucia Range to make his new film, I was surprised when he said that first he must take me to see the San Gabriel River Sanctuary. Had not enough time already been spent within that great city and why spend still more in another long trek across the city?

But he insisted and early one warm gray morning he watched for an opening and slid into an endless six-strand chain of traffic moving rapidly, half west, half east. The roar of speeding motors and the monotony of the endless succession of city streets discouraged conversation so it was almost a shock when a sudden turn took us from the racing cars and gas fumes. In little more than a block where the sound of traffic dulled to a muffled hum, we stopped by a sign: *San Gabriel River Wildlife Sanctuary—National Audubon Society.*

**"The children stared speechless at the golden beauty of a hooded oriole," Photograph, Mrs. Stultz with a class in the sanctuary, by Allan D. Cruickshank.**



The city was forgotten when we went through the gate and walked between native flowers and under a grove of trees to the museum. Flocks of sparrows and finches with a sprinkling of less common species fed and bathed in the places provided for them. Back of the museum were the warden's house, rest rooms and a picnic area, all within seven acres owned outright by the National Audubon Society. These form the nerve center for a program which spreads over many acres of leased sanctuary land where typical Sonoran life blends gradually into an Upper Sonoran Zone. It is an area of irreplaceable value because, except for a few trails, it has remained unchanged as long as records exist for it. Thus it forms a unique page of California history both from a natural and a conservation angle.

Not only is this sanctuary on a primitive, untouched area with a high underground water level but there is a year-round surface flow. Plant, mammal, insect and water life associations remain unchanged by man and nature's methods of soil erosion control may be observed. Moreover the area includes many types of habitat ranging from running water to fields and woodlands, thus providing an exciting and varied laboratory such as no longer exists elsewhere within the city—or near it, for that matter.

As one class of youngsters followed another through the sanctuary in quick succession, all day, we were impressed not only by the tireless enthusiasm and patience of the sanctuary leaders but by the reaction of the children. Apparently many of them had never before been in a real woodland or exercised their senses in appreciation of the out-of-doors.

We were told that many of them have only the movies and TV on which to base their knowledge of the out-of-doors. No wonder several fourth-graders were so oblivious that they failed to see us even when we nearly fell over them! They sat on the ground and watched entranced as five male goldfinches flashed in and out of the birdbath while a little family of ducks quacked contentedly in the overflow; they stared speechless at the golden beauty



**These young men find in the sanctuary a varied laboratory of open water, marsh, field, woodland and dry chaparral.**

of a male hooded oriole stealing sugar-water from the hummingbird feeder! To see the delighted faces of those outdoor-starved children as they watched the live creatures in the sanctuary would be sufficient reward for many a nature-center leader.

As we watched the trips along the carefully planned nature trail develop, an astonishing fact began to emerge. These children, who had no first-hand knowledge of the out-of-doors, already knew some of the problems of conservation and a bit about the many plants, insects and fish communities they were seeing for the first time. We discovered that the sanctuary directors had carefully worked out plans which classroom teachers used to prepare their classes for sanctuary visits. So when it arrived, each group of children has a beginning knowledge which is then deepened and confirmed by actual experience. Each child sees how roots hold water and help to prevent flood damage. Each child sees birds that were

pictured in his books so he remembers them. He sees the work of various insects and mammals and with the examples before his eyes, he grasps nature's balanced plan.

It is not just children and the future of Los Angeles that benefit from the instructions of the staff of this lively nature center. The National Audubon Society has a far wider and deeper purpose than that of introducing children to the out-of-doors and laying a foundation for sound conservation to put in practice at some distant time. Its aim is to reach as wide a public as possible and awaken it to the immediate need for conservation of soil, water, plants and wildlife and the relation of such conservation to our welfare. So youth leaders, teachers, scout masters, garden club members and any others with far-reaching influence are not only taken on trips through the sanctuary trails but they are given help in building conservation programs for use with their particular group. Courses for adult leaders are part of the sanctuary program.

As we talked with the directors and watched their program in action, it seemed as if every day of the week was full to overflowing. Yet added to the program within the sanctuary, exhibits are prepared for display at meetings of various groups throughout the county. These displays give a dramatic picture not only of the sanctuary work and conservation but of the Audubon work as a whole.

In my enthusiasm for the work of the San Gabriel Sanctuary, I have neglected its unique value to the individual. A large, primitive area so close to a great city gives the naturalist, either professional or amateur, a valuable and accessible place to pursue his studies. The insect man whose wish to find undisturbed California insect life has been frustrated by agricultural spraying can here find his subjects living as they did in the past. The botanist would search long before finding such a varied collection of plant communities within a limited area. The bird-watcher, looking over the list of 186 species that have been observed at the

sanctuary and seeing the flocks of birds at the feeders and baths, knows his checklist will show a satisfying total after a few hours of birding. Also, he will study each bird he sees with particular interest in the hope of adding a new species to the already long sanctuary list.

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## ★ N A T U R E

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*Reprinted from*

*The North Westchester Times, Thursday, May 1, 1952.*

### AUDUBON JUNIOR CLUB HONORS NANCY BLISS, 6TH GRADE PUPIL

The nine millionth member to enroll in an Audubon Junior Club, Miss Nancy Bliss of Bedford Hills, was honored yesterday during a ceremony at the monument to John James Audubon in the yard of the Church of the Intercession, Broadway at 155th Street, New York.

Miss Bliss became the nine millionth member when she joined an Audubon Club in the sixth grade of the Bedford Hills High School.

These clubs, of which there are about 10,000 in North America have been enrolling boys and

John H. Baker, President of the National Audubon Society, presents a certificate to Nancy Lee Bliss, Bedford Hills, New York. She was the 9,000,000th member to enroll in an Audubon Junior Club.



It was late when we left the San Gabriel River Wildlife Sanctuary. We took with us the firm conviction that all educators and conservationists would be wise to take note of the program carried on at the sanctuary. California has many state and federal parks that are beautiful and often spec-

tacular. But I feel sure that not one of them will have more far-reaching effect on the future of the state than the San Gabriel River Wildlife Sanctuary tucked within the far-flung boundaries of California's largest city.

. . .

## I N T H E N E W S ★ ★

girls since 1910 when they were founded by the National Audubon Society with the objective of interesting children in observing and protecting birds rather than killing them, which was common practice at the time.

Standing in front of the Audubon monument, which marks the grave of the famous artist-naturalist and was built with funds contributed by school children, John H. Baker, president of the National Audubon Society, presented Miss Bliss with a certificate as her 26 fellow club members looked on. He also gave commemorative gifts from the Society to her teacher and club adviser, Miss Hilda Carlsson, and to George C. Richter, principal of the Bedford Hills High School.

### *Picnic Before Event*

Main speaker at the ceremony, which began at 1 P. M., was Dr. Gustav Swanson, head of the conservation department at Cornell University, who said his own interest in nature and conservation could be traced back to an Audubon Junior Club his teacher formed in the third grade of a Minneapolis school. Dr. Swanson, who is a director of the National Audubon Society, stated, "The Audubon Junior Clubs laid the groundwork for the current boom in popu-

lar interest in nature study and the development of national concern over the depletion of our renewable natural resources."

Mr. Baker commented that a majority of the nine million enrollees in Audubon Junior Clubs are alive today and that "their thinking has had and is having a profound effect upon governmental conservation policies."

He called upon Robert J. Hamerslag, representing the Bedford Audubon Society, who said there are now 20 Audubon Junior Clubs in the Bedford area and that the Society has recently engaged the full-time services of a naturalist, Stanley Grierson of Katonah, to work in the northern Westchester schools in furthering the Audubon program.

Guests invited to the ceremony included representatives of the Boy and Girl Scouts, Campfire Girls, Bedford Audubon Society, American Museum of Natural History, and the Church of the Intercession. Just before the event Miss Carlsson's Audubon Club members were guests of the National Audubon Society at a picnic featured by a huge cake with a frosting-replica of an Audubon club button. It was made in observance of the 167th anniversary of Audubon's birthday, April 26, 1785.

## THE BOYS WILL BE SORRY THEY SHOT THE BIRDS

Reprinted from the *Atlanta Journal* and the *Atlanta Constitution*, December 9, 1951.

It was an old, old lady who telephoned and her voice trembled, perhaps with years and perhaps with anger. "I want you to write something about these mean boys who shoot birds."

The boys aren't mean. They are just boys.

Every youngster wants a gun and many of them want to shoot at living targets—birds and rabbits and squirrels. Maybe if their parents taught them, the boys wouldn't destroy birds. But if their parents fail when they are young, then the years will teach them. After they are older, they will no more shoot a songbird than

trample a bed of flowers or destroy beauty in any of its forms.

They will wake some mid-March morning and hear the announcement of spring, the squeaky little voice of the phoebe, back again and saying spring for sure. They will hear the shrill whistle of the cardinal and see the scarlet flash of his wings. In the elm tree a robin is singing his crazy song, and in the thicket the thrush makes such music that we stand still to listen. At night, as we drift off to sleep, the mockingbird far back in a water oak, sings endlessly from his myriad throat.

The bluebird sits on the cedar fence and

*Continued on Page 193*



Photograph of parula warblers by Allan D. Cruickshank

## HELP WANTED!

By Edward A. Armstrong\*

ANY naturalist who keeps watch at the nest of some small bird when the nestlings are sizable youngsters is likely to be impressed by the devotion of the parents in feeding them. From before the sun peeps over the horizon until dusk, the nest is the scene of constant comings and goings.

At a wren's nest in England, to which I attached apparatus to record each visit of the parents to the young, I found that food was brought on almost 400 occasions during the day—and this by a single bird

—the female. The male wren left his mate to do all the chores for seven nestlings while he spent his time looking around for another partner to occupy one of the half-dozen nests he had built.

Contrasted with this lack of cooperation by the male, we have the achievement of a house wren which lost his mate and reared the young unaided. In one day he made 1,217 visits to the nest. It is not surprising that birds working so hard sometimes lose weight during this period of arduous activity. Even when both parents help to provide for the family they are sometimes hard put to obtain sufficient food for them.

Birds are so adapted to their surround-

\*Author of the following books, "Birds of the Grey Wind," "The Way Birds Live," "Shakespeare's Imagination," "Bird Display and Behaviour," "Bird Life."





Young house wrens photographed by Hugh M. Halliday.

**Birds, during their nesting seasons, are among the busiest creatures on earth. A distinguished English ornithologist gives some interesting examples of cooperation in the bird world.**

ings that they often perform their duties in ways that save themselves unnecessary work and wasted time, for birds, when rearing young, are always working against time. In particular, some migratory species, such as the swifts and swallows which hunt flying insects, must not dally or their young may not be on the wing before a lack of insect food or the impulse to migrate southward asserts itself, forcing them to desert the young ones before they are fledged.

Most birds nest as near as circumstances permit to where their food supply is plentiful. Probably, if we knew more about certain species which are unaccountably local in their distribution, we would dis-

cover that some of them rely on types of food which are restricted to the nesting locality. If suitable nesting material is not available within a certain distance, some birds will not, or cannot, nest. House martins in England are so dependent on damp mud as building material that they do not breed far from ponds or streams.

The importance to some birds of saving labor and time is shown by a comparison between the nesting sites chosen by the bittern and the gray heron of England. If there are no tall trees available near its fishing grounds, the gray heron may nest at some distance from its food supply, but the bittern nests in the marsh where its food

is plentiful and no time is lost in flying long distances to feed itself and to bring food to its young. Although the hereditary nest site requirements of these birds (the heron in trees, the bittern on the ground) and not available food, dictates the choice of the nest site, the bittern's choice saves it time and energy because this is a species in which the female only raises the family.

One of the ways by which human beings save time and trouble is by storing food. Nowadays refrigeration, partial cooking, dehydration, and other means of preserving food, are taken for granted. We forget that in many parts of the world, life was impossible or very precarious for men until they solved this problem, for outside the tropics there is in many parts of the world a season of food abundance followed by a season of food scarcity. For primitive people, the discovery of how to smoke and dry fish and meat made it possible for them to survive in areas with harsh winters.

Although a number of mammals and a few birds, such as the nutcracker and some woodpeckers, store food in winter, almost the only birds that do this in the breeding season are some of the shrikes, which, when

food is relatively plentiful, impale insects, lizards, mice and small birds on thorny branches to be eaten when needed. Owing to the perishable nature of their food, such storage for a rainy day cannot be very effective.\*

The greatest labor-saving method among birds—that of leaving others to do all the work of rearing the offspring—is used by the cowbird in North America, the cuckoo in Europe, and a considerable number of tropical species. The cuckoo of Europe removes one of the eggs of the bird she is about to victimize and lays an egg of her own in its place. Then she flies off and takes no further interest in the egg or in the young cuckoo when it hatches. For any species which adopts this labor-saving system it is often true that nothing fails like success. If the cuckoo tribe multiplied beyond a certain point it could not find enough foster-parents for its young.

Another possible "labor-saving device" is to spread the load, to share the work with others. In various forms this is not uncommon among birds. For example, when young Sandwich terns get beyond the nestling stage they stray from their nests and gather in groups on the beach. The parents in each family no longer concentrate on feeding their own offspring but feed all and sundry in the party. Probably what each chick gets depends largely on the vigor with which it waylays any comer-in with food.

This system may well have advantages in times when food is scarce, for instead of many chicks having to subsist on a starvation diet and growing up to be weaklings, or even perishing before leaving the breeding ground, some of the young terns are adequately fed and live to perpetuate the race. The price of the survival of certain ones is the death of others—those young terns which are less fortunate in receiving food. Among Sandwich terns this crèche, or communal care, system is more than a convenience for harassed parents; it is probably essential to the survival of the species.

\*The dried carcasses of mice, small birds, grasshoppers and other animals that shrikes have hung up and failed to eat, suggest that they do not usually return to their stored food supplies.—The Editors



English robin photographed by the author.



It is quite certain that this is so with emperor penguins. They breed in the most severe weather conditions of any bird—amid the darkness and blizzards of the Antarctic winter. They make no nests, for there is nothing but ice and snow of which to make them, and the chicks would soon freeze in the below-zero temperatures but that they are supported on the feet of the adults. If an egg or a chick slips from its place on a bird's webs, neighbors immediately rush to brood it. So strong is the brooding impulse that penguins will cuddle a dead and frozen chick. This parental solicitude is an adaptation to conditions in a rigorous climate. It is effective because it insures the survival of enough young emperors to perpetuate the species.

The day nursery system as practiced by sheld-ducks enables the majority of the adults to migrate before their young are quite independent. When some weeks old the ducklings merge into flotillas composed of birds of several broods and a restlessness overtakes their parents. They fly off from Great Britain to Heligoland, where they molt in a very large flock, leaving behind a few of their number to pilot the parties of well-grown ducklings on their feeding excursions in the bays and estuaries. Thus the majority of the adults are enabled to pass the period of the molt, when they are



Photograph of a song thrush by the author.

most vulnerable, in a safer area than that in which they breed.

Among some birds of the same species, a number of females will lay their eggs in the same nest. These birds are largely tropical—the black ani of Trinidad is one, an odd-looking creature somewhat like a long-tailed crow. When I climbed to a nest I was surprised to find a heap of eggs in the bulky structure. Several females lay in one nest and all the birds share in feeding the young. This system could only work if the females came to lay at the same time; otherwise there would be eggs and young of very different ages in the nest and confusion would result. We must suppose that asso-

A young English cuckoo throwing hedge sparrow's egg out of the nest. Photograph by the author.



ciation with one another in the flock has the effect of bringing the females into breeding condition at the same time.

There are some species in which a bird, other than the mated pair, assists the parents in feeding the young. Once when I was making observations at a long-tailed tit's nest I was surprised to see three birds together at the nest, each with food for the nestlings. I found that this third helper was working just as hard as the parents. Frequently the trio came to the branches near the nest almost simultaneously and then two would wait about in the twigs until the third had delivered his or her beakful. There are several other records of similar situations so probably the attendance of a third bird at a long-tailed tit's nest is not rare.

These *ménages à trois* (domestic establishments of three) are due in part to the strongly social nature of long-tailed tits. Apart from when they are nesting they are usually seen in groups. Even when a pair settles down to nest they do not manifest the dislike of trespassers of their own species typical of most birds. With many bird species, intrusion by another into its territory usually arouses it to vigorous defense. This makes it difficult, if not impossible, for individuals of some species to help at a nest even if they had the impulse to do so. But the long-tailed tit does not defend a territory as so many other small birds do, and thus a volunteer helper is tolerated. Whether these bird assistants to the parents are not fully mature is not known. Occasionally, large clutches of eggs are found in a long-tail's nest and one suspects that two females have laid together. Perhaps these trios sometimes consist of two females and a bigamous male, but it seems more likely that one of the birds is a bird of the previous year which has not reached breeding condition.

The fairy-wrens of Australia are among the species in which it is not uncommon to find a third helper at the nest and it is known that this is not another mate of the male's. Similarly, the home-help to house wrens in Central America is sometimes by a bird of the previous brood. It is not

uncommon to see young waterhens of the first brood feeding their parents' second batch of young ones.

Nearly every naturalist widely experienced with birds has discovered a bird of one species helping to feed the young of another. For some days I observed a song thrush's nest at which a robin appeared frequently and fed the nestlings. His mate was sitting on her eggs only two feet away but she showed no interest in the doings of her partner. He avoided going to the thrush's nest when either of the parent song thrushes was there, so there were no squabbles. His help cannot have been of much value for the small caterpillars which he contributed did not compare with the large worms brought in by the song thrush parents.

There can be no doubt how this curious situation had arisen. The male robin makes courtship gifts of small edible morsels to his mate when they pair-up, and when she comes off the nest to feed. When the young ones hatch, he also helps to feed them. Thus even before the young of his own brood appear, his impulse to give food is already aroused. At sight of the yellow mouths of the young thrushes the robin redbreast reacted to them as if they were his own progeny.

In spite of the great diversities among birds in rearing their young, the usual habit is for the pair to cooperate and remain faithful to each other and their domestic responsibilities until the young are independent. Among the larger species there is even a tendency for the couple to remain faithful from year to year. Swans, geese and ravens, for example, remain paired for years, and some may remain mated for life. The length of life for small birds is usually so short—only a year or two—that pairing in successive years between the same individuals is seldom possible.

Among longer-lived species the pair-bond is more enduring and the adjustment to one another which monogamy involves apparently contributes to their survival; to the efficiency with which they rear their families; and, let us believe, to the pleasantness of their lives.

[The third in a series about]

## YOUR *Wildflower* GARDEN

The beginner in wildflower gardening should plant only those flowers native to his region.



Photograph by Rutherford Platt.

By Carol H. Woodward\*

WHEN the dwarf crested iris\*\* of the Southeast is planted in the wildflower garden, a setting of gray rocks against hemlocks and birches will accentuate the beauty of each violet-blue flower. Although it likes deep rich leafmold, this is one of the few woodland plants which will grow in fairly shallow, dry and neutral soil. It transplants readily, especially just after it has bloomed.

As a companion, where there is less protection from the trees, the birdfoot violet will make itself at home. Sand and a little aluminum sulfate for acidity will fit the soil to its needs. If constantly picked it will flower much longer than in nature.

About this time of year are seen the first rough, slender leaves of the bristly aster.

\*Miss Woodward, now a free-lance writer on botanical subjects, was on the staff of the New York Botanical Gardens for 20 years where she edited the *Journal of the New York Botanical Gardens*. She has brought many kinds of wildflowers into cultivation at her country place in Connecticut.

\*\*The author gives throughout her article, the common names by which these wildflowers are known both to nurserymen and to amateur botanists. The scientific names can be found for each by referring to various plant identification manuals.

It too grows best in acid, gravelly soil where the sun creates a quasi-desert atmosphere. Given a little humus it will make far showier clumps of bloom than its dwarfish stems exhibit along roadsides in September. It is better transplanted to the garden now than later, when it is in flower.

The beginner in wildflower gardening will do well to start with plants that are native to the immediate region. These will encourage him, for they are almost certain to succeed if their original soil, moisture and exposure can be duplicated. The novice will also be wise to try mostly herbaceous plants at first, avoiding the trees and shrubs until he has had more experience. Yet it is the woody plants which provide the most natural background. In a dry-soil garden, the low-spreading juniper of New England pastures can be attractive the year around. Even in the arid sections of the Middle West it can be planted.

If there is a dry slope to be covered, the bearberry is the ideal shrub, for the more barren the soil the more successfully will it blanket the ground with its small, dark

evergreen leaves. This, however, is not a plant to dig up from the wild. Nursery-grown specimens from cuttings offer the only reliable means for survival.

Down at the foot of the hill where a small stream keeps the ground moist and cool all summer, quite different plants must be found for a wildflower garden. Here, in May, *Mertensia*, or Virginia bluebells, will luxuriate in half-sun, then make way for later flowers by letting the foliage die as soon as the seeds are ripe. Just before they disappear from view is a good time to dig them for the garden.

An open marshy spot can be adorned with tall blue flags. Where the acid soil is merely moist, the queen of ladyslippers, *Cypripedium reginae*,\* can be grown, particularly if its handsome white and rose flowers can catch just a little sun.

Since the heavy soil of wet areas is slow to absorb the season's warmth, young plants

of perennials for late-season bloom may be set out much later here than in the drier parts of the property. The blue lobelia and its vivid counterpart, the cardinal-flower, a favorite of hummingbirds, will thrive year after year where water washes their roots. The turtlehead will happily accompany them. Later in the season the closed or bottle gentian will prove itself a flower of quality in a wet-ground planting.

The majority of plants that gardeners bring home from the wild or from wild-collected seeds are the woodland species—those which require considerable shade and deep, rich, acid leafmold at their roots. Of the few which demand lime, the rare white ladyslipper, dwarf white trillium, and grass of Parnassus for wet places, besides a certain few of the ferns, are the plants of greatest interest to the wild garden.

A gratifying number will grow and bloom in ordinary garden soil. They look their

\*Neither the author nor the National Audubon Society approves the transplanting of orchids and other rare flowers from the wild, unless these flowers are threatened by construction projects which may destroy them.

**The yellow pond lily spreads by dropping on the water its hard seed pods which float away from the parent plant.**



The spatterdock, large yellow pond, or cow, lily, grows in the shallow water or in muck at the edge of ponds. The bright yellow, globe-shaped flowers are about two inches broad, and the plant, which is widely distributed east of the Rocky Mountains, blooms throughout the summer. In the small pond it grows so vigorously that it may crowd out other plants. Photograph by John H. Gerard.





The wild geranium, *Geranium maculatum*, is a fine plant for the wildflower garden. It is practically free of diseases and insect pests.

best, however, when they are given naturalistic rather than formalized surroundings. From spring to summer bloom, some of these undemanding wildflowers are the harbinger-of-spring, *Eriogonum bulbosum*, bellwort, goldenseal, squirrel corn, white dogtooth violet, *Erythronium albidum*, Virginia bluebells, wild geranium, large Solomon's seal, Jacob's ladder, American bluebell, Oswego tea, and white snakeroot.

Among the choicest of the native plants which insist on acid leafmold are the small ones which remain green all winter long. In colder climates than their native homes, they will need a covering of dry leaves held in place with branches over winter. In warmer regions they should have additional shade and extra moisture in summer.

Easy to transplant, easy to root from cuttings, and easy to grow in the shade with leafmold at its roots, the partridge-berry makes a neat low mat of green. Bright red

berries follow the pairs of tiny fringed flowers. Another good red-fruited ground cover is wintergreen—much larger in stature, though still only about four inches high.



berries follow the pairs of tiny fringed flowers. Another good red-fruited ground cover is wintergreen—much larger in stature, though still only about four inches high.

The pipsissewas, which will be blooming in July, tolerate a drier, leaner soil than most of the other woodland plants; but only very young seedlings can be transplanted with success. Their frequent companion, pyrola, or shinleaf, flowering earlier, has much the same behavior.

Far easier to handle is the diminutive white orchid which bears the unfortunate name of rattlesnake plantain. Its slender white spire of waxy flowers rises in summer from a small rosette of white-veined leaves. Probably no other orchid is more amenable to being moved into a shaded garden.

Each of the other orchids presents its own problem. It will be better to refer the reader to books which give specific directions.\* We can not save some of our most precious wildflowers through transplanting, unless their cultural whims are respected.

\*The editors of *Audubon Magazine* will be glad to send a list of recommended books on the culture of wildflowers; also a list of nurseries specializing in native plants.





John James Audubon collected the hoary bat, from which he made this painting, in Hoboken, New Jersey.

*All photographs by the author.*

## Audubon's Bats

By Charles E. Mohr

**B**ATS' complete mastery of aerial navigation intrigued Audubon, just as it long baffled scientists and terrified the superstitious. As a result of his little-known studies on the subject he concluded that the wings of bats, rather than birds, offered the solution to aerial transport by man.

"If we look at the construction of the wings of bats, along with their internal structure, it will appear as if probable that should our own species ever attempt to fly through the air with wings they will have to be constructed on the principle belonging to these most curious animals."

Audubon's prophecy, made in 1846, was penciled in the corner of a drawing, one of a newly found collection of water colors that definitely establishes his keen interest in the fascinating flying mammals, a concern that went almost unnoticed for more than a century.

To be sure, his account of a bat-hunting episode by the eminent but eccentric Rafinesque while visiting the Audubons at Henderson in 1818 is well known.

"We had all retired to rest," related Au-

dubon. "Every person, I imagined, was in deep slumber, save myself, when of a sudden I heard a great uproar in the naturalist's room." Rushing to Rafinesque's quarters he found his guest running around the room stark naked "holding the handle of my favorite violin, the body of which he had battered to pieces against the walls in attempting to kill the bats which had entered by the open window, probably attracted by the insects flying around his candle."

"I stood amazed," wrote Audubon, "but he continued jumping and running round and round, until he was fairly exhausted, when he begged me to procure one of the animals for him, as he felt convinced that they belonged to a 'new species.' Although I was convinced to the contrary, I took the bow of my demolished Cremona, and administering a sharp tap to each of the bats as it came up, soon had specimens enough."

Audubon himself, in collaboration with the Reverend John Bachman described a number of new species of bats. But due to their superficial resemblances, resulting in a lack of critical data in his descriptions and to the disappearance of the "type"

specimens, all but two of the names have passed into the oblivion of synonymy, the scientific graveyard of duplicate names.

Until last year this constituted virtually all that was known of Audubon's bat studies. Then, just as Alice Ford's handsome volume of "Audubon's Animals" was going to press, an unsuspected series of paintings of bats was found among the many hundreds of original water colors of birds and mammals in the New York Historical Society's priceless collection. Miss Ford mentioned the discovery briefly, and reproduced four fine drawings of the free-tailed and red bats.

Imagine my excitement when I examined the bat pictures and found 26 water colors, two of the bats with wings spread, and accompanying unpublished notes which give these unique drawings extreme interest to scientist and layman. Paintings by both father and son are included in the series.

One bat in particular I was looking for—the smallest North American bat, *Myotis subulatus leibii*, named by Audubon for the Philadelphia physician who collected

and sent it to him in 1841. This was the bat which some 20 years ago led me into a fascinating scientific hobby, speleology, the study of caves.

While engaged in graduate work at Bucknell University I learned that a new species of bat had been collected in a central Pennsylvania cave. Thinking that it was Woodward Cave, 30 miles away, I hurried there in midwinter, picked a score of hibernating bats from the wall, dropped them into a knapsack and cached it in the rumble seat of my car.

Hours later when I opened the rumble seat, a squeaking flight of bats emerged. That is how I first learned that bats arouse quickly from hibernation. Three bats remained in the bag, however, and these I put into the nearest container at hand, an empty cigar box. Under the pressure of laboratory work I forgot the bats. Three weeks later I remembered them, but opening the box, I found them dead, mummified.

Later that winter I took them to the Reading, Pennsylvania, Museum, where mammalogist Earl L. Poole quickly told

Those bats which do not migrate, hibernate in caves.



me that I hadn't found the bats I was looking for—I later saw them in Penn's Cave. But he recognized one of my specimens as the small, rare Leib's bat. In the 80 years since Audubon's description had been published, he told me, only eight of these little bats had been collected.

I have since searched museums in vain for Audubon's lost specimen. Both of the newly found skins at the New York Historical Society are larger species, but among the drawings I found one marked, "from Dr. Leib, procured in Erie Co., Michigan, Sept., 1811. No name to it." My search had come to an end, for certainly the existence of a water color, carefully drawn from the original specimen is almost as satisfactory as having the specimen itself.

This was clearly the bat I had come to know so well in hunting out its wintering spots in the limestone caverns that honeycomb the Central Pennsylvania hillsides. It is dapper looking, with neatly pointed black ears and mask, contrasting against the silky, often golden fur. Its small size and solitary habit makes it easy to distinguish. But, tiny as it is, it is surprisingly hardy. Most other species of bats enter the caves and become dormant by late September or early October and stay till May. Leib's bat, I came to realize, remains active till December, hangs in the almost freezing entrance passages and rarely stays past the end of March. Farther back in the caves the temperature is a comfortable 55° the year 'round, and there the other varieties dwell.

Each winter I found more Leib's bats, as many as 65 in 1912-13. But though I scoured several hundred caves from Pennsylvania to the Missouri Ozarks, and south to Florida, I seldom found them outside an area 20 miles wide, in Mifflin and Centre Counties, Pennsylvania. Even more surprising was the discovery of a still greater concentration in a single cave 325 miles to the north, in eastern Ontario. In a limestone cave at Fourth Chute, zoologist Harold Hitchcock found 144 Leib's bats in one season. And though a few have now turned up in New England, New York, New Jersey, Kentucky, and North Carolina caves,

95 per cent of all known individuals winter in the two focal points mentioned.

We collected very few of these rare bats. There were too many questions which could be answered only by letting them live. In search of answers I began banding bats in 1932, the first banding of cave bats in America. I discovered, among other things, that bats return faithfully year after year to the same winter roost. Among a series of 899 little brown bats which I banded in an abandoned iron mine at Durham, Pennsylvania, were some that turned up again every winter for five years, one six years in a row, and another in seven out of eight winters. And in 1950, I found a Leib's bat which I had banded in February, 1941. It had attained a venerable age of at least nine years. This is a remarkable age for so small a mammal. Few shrews and moles, comparable in size, live more than a single year.

Where do they spend the summer? By finding and banding the winter concentrations we hoped to discover where and how far they go when they desert the caves in spring. Most summer recoveries of banded bats have been in barns, churches, or other buildings within 10 miles of the hibernating quarters. But long flights also are made. In New England, Donald Griffin discovered that some bats migrate from mountain caverns in Vermont to summer roosts on Cape Cod, Massachusetts, an airline distance of 168 miles!

There is no hint in Audubon's writing that he ever entered a cave, where he might have found bats by the thousands or tens of thousands. Wyandotte Cave, 75 miles east of Henderson on the Ohio River, probably had not been explored, but at least 20 caves were known in Kentucky by 1800, and Mammoth Cave, 100 miles to the south-east, was opened to the public in 1816. In some of the caves around Mammoth I have counted as many as 30,000 bats, while in northeastern Kentucky, I once discovered a population of 80,000 to 100,000 bats.

It is, naturally, much easier to secure a dormant bat as it hangs head down from cave wall or ceiling than to catch one on the wing. In his journal of the Missouri



Audubon made many drawings of bats, but did not publish any of these in his work on the quadrupeds of North America, possibly because bats, although mammals, are not four-footed animals.

River expedition, Audubon writes several times of seeing bats without being able to collect them, then of finally succeeding in shooting one—*Vespertilio subulatus*, as it was known at the time. Its portrait is among the water colors just found.

There are perhaps few more difficult targets than erratic bats dodging crazily in the dimming twilight. They do, of course, occasionally fly in full daylight, improving chances for observation or collecting. Two of Audubon's handsomest bat portraits, studies of the hoary bat, our largest species, bear this penciled notation: "Procured at Hoboken, N. J., December 6, 1841, at 12 o'clock of the day, when it was flying in full vigor."

It must have been a balmy December day for he added that a big brown bat "was also procured alive on the same day at St. James Place." Surprisingly, a third species was taken two days later, the seldom seen silver-haired bat, a distinguished looking black bat with scattered frosting of white hairs. This was collected by his son, John Woodhouse Audubon, at their home "at Minies Land, nine miles above the city of New York on York Island."

Ordinarily, flying bats are rarely seen in winter. Eight species of eastern bats move to caves and mines where they hibernate. Most of the others, the so-called tree bats, migrate southward in fall and spend the winter where insects fly the year 'round.

It is not through banding that we know of the long southward migration of red, silver-haired and hoary bats each fall, and their return in spring. Rather it has been the occasional report of daytime flights of little bands of red bats, for instance, and of their appearance on coastal islands in spring and fall that has indicated that such annual flights take place. Red bats reach the Bahamas in winter and sometimes land on ships hundreds of miles at sea.

The rigors of migration, and the hazards of unsheltered roosting by day, make it understandable that tree bats have larger families than the more colonial cave bats which seek the shelter of caves and buildings. The tree bats give birth to three or four young early each summer; the cave bats manage with but one young a year, occasionally twins.

We have found nearly half of our banded cave bats a year or two later, some after as much as 8 or 10 years. At such a rate it is not surprising that tremendous bat populations have been built up, particularly in the Southwest. In Carlsbad Caverns, New Mexico, and in several Texas caves, exist colonies of free-tailed bats each in excess of ten million.

Except for an occasional bat that falls prey to an owl, or to a falcon lurking in wait outside the cave at dusk, animate dangers are insignificant. The environment itself constitutes the greatest hazard. In Minnesota, an early snowstorm blocked a cave entrance and more than a hundred big brown bats froze to death as they tried too late to find shelter inside. In Vermont, one cave is so exposed that bats attempting to hibernate there often are found frozen in ice stalactites which form near the entrance.

In Pennsylvania, in the great flood of April, 1936, and again in the November 25, 1950 storm, ground water levels rose 30 feet or more in a few hours, trapping thousands of bats in their subterranean quarters. After those storms, I found dead bats still hanging from the walls though most of them had been carried away by the subsiding underground waters.

Hibernating creatures must find three

conditions before they can become dormant; darkness, quiet, and a cool, even temperature. These they find in caves. But each winter as more spelunkers visit the wild caves and more tourists the commercial ones, bats are disturbed with greater frequency. When aroused, their metabolism quickly increases and soon they are flying about in search of greater seclusion. Each time they fly they use up an extra amount of their precious energy supply, stored in the form of fat beneath their fur.

Too many intrusions of the hibernating quarters will result in the depletion of these energy rations beyond the danger point and then the bats will starve before replenishments in the form of flying insects are available.

I have been alarmed at the serious decline I have noticed in the size of bat colonies in Pennsylvania and Tennessee in the last 20 years. In the Keystone State our only populations of the so-called cluster bat consisted of three colonies ranging in size from 500 to 2,000 individuals. Now they have virtually reached the vanishing point, less than 50 bats remaining in the three caves. Two of the caves are commercially operated, with a year 'round business. The third is one of the most popular spelunking caves in the state. The bats couldn't take it.

Our efforts to transfer to undisturbed caves a goodly portion of the thousands of bats that occupied the 60-year-old tunnels of the South Penn Railroad, in 1940, before their transformation into Pennsylvania Turnpike tunnels, proved futile. So strong was the bats' homing instinct that they returned to their former quarters, by then uninhabitable. Virtually all of them must have perished.

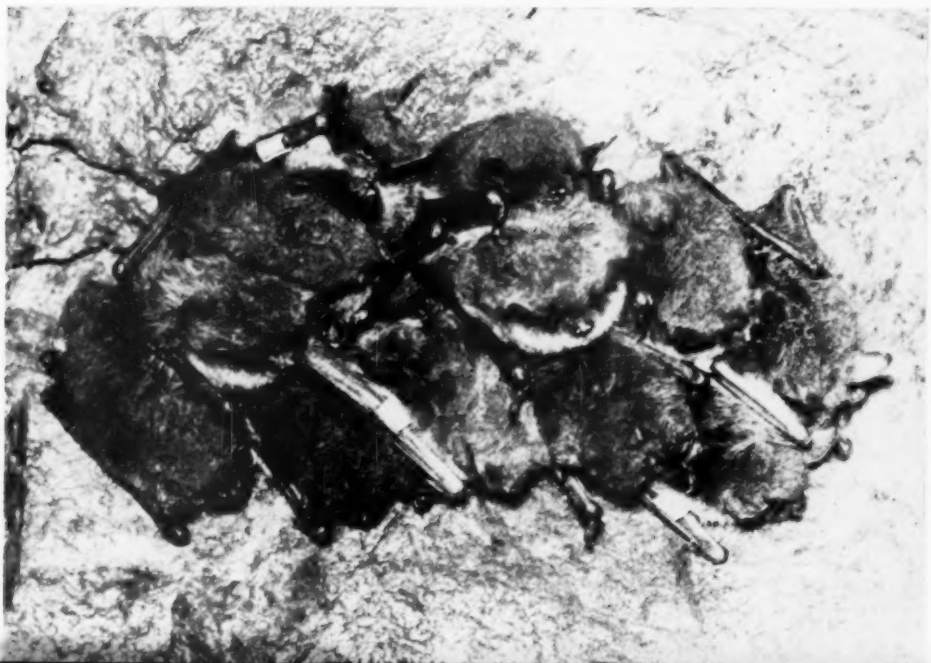
Countless biology students and other persons intrigued by the marvels of a bat's anatomy and way of life have carried off specimens to home or school to frighten or enlighten their friends and classmates. To all my advice is, "look, learn, and leave them where you find them." They are valuable though peculiar members of the wild-life community and have an important role to play in the intricate web of life.





The Leib's bat shown hibernating in a cave is the smallest of the eastern species. It is only two inches long from the tip of its black pointed nose to its toes.

Numbered aluminum bands, loosely attached to the arms of bats, tell how long bats live and the extent of their annual migrations.



# The President

By John H. Baker



# reports to you

President of the National Audubon Society

## Bahama Wardens on Duty

YOU will remember that the Society for the Protection of the Flamingo in the Bahamas was recently formed. It is providing warden service, equipment and supervision for protection of colonies this year on both Inagua and Abaco; also on Andros, if flamingos appear there. Robert P. Allen of the Society's staff has already spent 18 months on field research with regard to the existing numbers, distribution and needs of the American flamingo. Recently he and your president flew to the Bahamas with Stephen F. Briggs in his plane, and surveyed Andros Island from the air, observing no flamingos, but spotting one of the old nesting sites, with more than 500 of the mounds still intact and clearly visible. It was perhaps a little early in the season to expect the flamingos to have arrived in the area where as many as 10,000 of them nested as recently as 1910. On the following day, however, Bob Allen received a cable from Inagua, the southeastern-most of the Bahamas, to the effect that a large number of flamingos were already nesting. He was soon on his way there, and we all fervently hope that this great colony will succeed this year in raising a large number of young.

## Whoopers on Balanced Diet

Your president had a visit with George Douglass, Superintendent of the Audubon Park Commission in New Orleans, and found the two captive whooping cranes, Crip and Jo, in fine condition. There was finished in March a special enclosure about 300 x 300 feet, hidden from public view, surrounded by a wire fence and provided with a pool of running water 10 x 10 feet in

size, in which the cranes, as is their custom, may wash their food. There is vegetative cover; the grass will not be cut; the outside fence is cat and dog proof. It is hoped the birds will nest successfully this spring; they have been "dancing." In addition to the special rations to which they became accustomed while at the Aransas National Wildlife Refuge in Texas, they are additionally receiving at Audubon Park (in lieu of normal wild foods obtained by them in the natural marsh in Texas) raw soft-shelled crabs and, in season, live crawfish, both of which are eaten shell and all. They are regularly fed raw shrimp and a teaspoonful a day of wheat germ oil—all this in addition to ground horse meat, mashed hard-boiled eggs with shells, whole corn kernels and Purina laying pellets. How'd you like to be a whooping crane?

## Report from The Rainey

In late March southwest Louisiana was all abloom, and at the Rainey Wildlife Sanctuary the mesquites were bursting into golden glow and the Chinaberries into lavender. The white flowers of the hawthorns and dewberries added to the charm and the prickly ash, or toothache trees,\* were in full bud. Kingbirds in large numbers had arrived on northward migration, as had green herons, some of which remain there to nest. By late April trees and shrubs on the canal dikes and those on the natural cheniers will be literally full of migrating birds that have either come across the gulf, or around its western border through Central America and Mexico. The abundant

\* Toothache tree, *Xanthoxylum americanum*, the yellow-green flowers bloom from March to May, before the leaves have started.

summering birds include least bitterns, purple gallinules, green and other herons and egrets, marsh wrens, red-wings, orchard orioles, loggerhead shrikes, boat-tailed grackles and mottled ducks. Among the first to arrive each year, and to nest in the houses provided for them at the Society's landing at Intracoastal City, are the purple martins—normal arrival date, February 10.

An animal introduced from Brazil, the nutria, resembling in general a very large muskrat, or a woodchuck or marmot, has greatly multiplied after its escape from captivity, and is now the most abundant mammal in a large section of the southwest Louisiana marshes. Just what will be the long-range effect on the vegetation, and on use of this area by other wildlife, is problematical, but the chances are that there will continue to be very noticeable results of its feeding habits. Alligator grass, also introduced from Brazil, was taking over in a big way until nutria began working on it in volume; this is to the nutria's credit. Now large eat-outs are developing in what were practically pure stands of hog cane, and the nutria have made a start on the roseau canes that grow principally on the canal dikes. Initial results of these eat-outs are increased use of this marsh by ducks, shorebirds, egrets, herons, ibis and other water birds. They are also eating the mangliers or "mangroves," commonly known in the East as salt myrtle or salt bush. If these are greatly reduced, the boat-tailed grackle and green heron will have to find new nesting sites. To the north of the area in which the nutria are currently most abundant, your Society now has on its land square mile upon square mile of the finest stand of 3-square grass—ideal food for geese and muskrats—that is to be seen today anywhere in that region. We shall hope that the nutria develop a natural check on their own numbers, or confine their taste to alligator grass, hog and roseau cane, so that the fine stand of choice goose and muskrat food may remain intact as long as the natural cycle permits.

Nick Schexnayder, superintendent, and Ignace Hebert, his assistant, keep all the

Society's buildings and equipment in tip-top shape at all times. The Navy never did a better job. Members who visit this sanctuary, preferably during the months of November and December, will not only witness a great show of wintering waterfowl, but have reason to feel proud of the quality of management of the Rainey Wildlife Sanctuary.

### **Encouraging news about Island Beach**

In March, the New Jersey Legislature passed an appropriation bill containing \$2,750,000 for the purchase of Island Beach, the presumption being that after acquisition it would be maintained as a State Park.

It appears that all that is necessary now is to iron out the details of transfer from the present owners to the State.

Great credit is due Governor Driscoll for his backing of the State's acquiring Island Beach, and his expressed awareness of the cultural and scientific values, and the importance of maintenance policy that would preserve for all time the unique scenery, flora and fauna characteristic of the primitive New Jersey coast.

We should not forget that it is due to the treatment accorded the property through the years by the owners, members of the Phipps family, that it is now possible to preserve this beautiful strip of beach land for permanent public appreciative use.

*Photo of Island Beach by John K. Terres*



# Flamingo Hunt



By Paul A. Zahl

*(Dr. Paul A. Zahl of New York, who has made many studies of the American flamingo, had gone to Inagua in the Bahamas hoping to find an active flamingo colony that could be studied and the young banded. Camping on a remote lake, he and his native guide, John, had sighted about 1,000 immature birds.)*

BY ten o'clock next morning we were two thirds of the way down the lake. John and I had separated and were proceeding parallel 100 yards apart. The idea was that of a two-man broadfront piston—as yet at a considerable distance, to be sure—forcing the pink line of flamingos, ahead of it. In my pocket was a pair of pliers, and over my shoulder hung a small camera. In John's pocket was the ball of cord, and over his

Probably no other  
white man has been  
trampled by a thousand  
frightened flamingos.



Line drawings  
by Fritz Kredel

shoulder was a necklace of bird bands. The latter flashed in the sunlight, and he carried them as though never once doubting that we'd soon have plenty of flamingo legs in hand for banding. I wasn't quite sure of the plan, but John had everything figured out. We must concentrate the birds against the far end of the lake, he had said, then drive them along the north shore and into a bay there that tapered off like a funnel. How we'd actually catch the birds, once funneled, was still a mystery to me.

The herd sensed that something was afoot and, with the distance differential reduced to perhaps 300 yards, began to show signs of serious concern. Individuals spread loosely around the periphery of the mass hastened hubward. Ranks tightened, and before long the flock had retreated as far as

This is a portion of Chapter 11 from "Flamingo Hunt," copyright by Paul A. Zahl, published May 26 by Bobbs-Merrill Company. Reproduced by courtesy of the author and publisher.

it could, hard against the densely mangroved lake's end. All heads were high out of the water by this time, and from each periscope glinted a pair of hard, fierce, frightened eyes—all fixed in the direction of the two human figures moving clumsily down the lake but closing in inexorably. The flock had three possible routes of escape: between me and the north shore; between John and the south shore; or up through the center between us. Our aim was to prevent the latter two but to encourage the first. And yet we couldn't leave the favored north passage too wide, for then the birds might flee back up the lake past the bay entrance, out of our clutches. The whole thing was tricky and suspenseful and required a slothful balance of forces.

Except for their inability to fly and their lack of full coloration, these birds seemed like adults. Even as to size they were definitely not children. The correctness of this impression was borne out shortly when, under our increasing approach-pressure, several flame fragments ventured to make a



break for it, pell-melling wildly away from the main solar body. Necks and heads pressed forward, legs slashed at maximum speed, wings beat with all the furious churning characteristic of frenzied adults. Sprinting toes skimmed the water, and the winging bodies rose almost clear. But the lift power was not yet enough; the birds' feet soon sank back into the water and down to the lake bottom for support. Each individual which failed to fly would turn hastily and dissolve back into the group. Two or three, however, did actually manage for the first time in their lives to get into the air. For a few long seconds their air-borne status was in doubt, then proved. This was probably more of a revelation to

them than to us. With the sudden feel of flight their wings seemed to beat all the harder as they swung up over the mangrove, bound at last for the free-ranging life of adulthood.

Soon we were within 100 yards of the knotted herd's front lines. The birds eddied this way and that; one felt the internal pressure would any second cause the boiler wall to give at its weakest point. But when I had reached a position just above the bay entrance John signaled me to stop. He continued, edging closer and easing the herd leftward, then gently goading them on up-lake between me and the north shore. Beautifully according to plan they suddenly began oozing in the direction of what they thought was an escape hole. There was some crying and voicing, but not much; the birds seemed to direct their total energies into foot-and-wing action. A thousand pairs of sprinting legs made a sound suggestive of thunderless rainfall—one continuous wet murmur.

Why flightless flamingos are called "herds" by the natives was now clear: the movement was for all the world like that of a frightened herd of cattle. Even the dust was there—white spray from 2,000 legs slashing and splashing. From the air the flock would for a brief moment have resembled a lengthening teardrop. My presence just above the bay entrance left them no choice; into the bay they veered. By this time John was at my side, and we hurried in after so as to prevent any turn-around or retreat, although the word "hurry" to describe our movement across the lake swash is misleading. Our legs moved fast, to be sure, but mostly up and down; forward progress was anything but swift. The bay extended northward, but ever narrowing, a good quarter of a mile.

Now we had them, and as we closed in, the herd dumbly crowded into the bay's mangrove-walled V. It had been my vague impression that John's plan involved thus kraaling the herd tightly into that V and there somehow fencing them in with the cord. Then we could catch them singly for banding and release. But when John came



over, handed me one end of the cord and began giving instructions I realized I was wrong. It was evident now that he was up to one of the oldest tricks in the flamingo hunter's book, long since described to me by Robbie Ferguson and others. The classic technique is for two or more men to corner a group of pre-flight waders, then, with each man holding the end of a fishline or facsimile, force the birds to stampede out across it. The birds rush blindly through the space between the two men, who then pull the cord taut and begin sweeping it powerfully forward. Under the right conditions two good huntsmen can break the legs of dozens of flamingos within a few seconds and stun many more. These drop out of the stampede and float helplessly on the water. Once the rush for freedom has begun, there is no stopping it. The birds will keep hurtling into the cord trap—some successfully hopping over, some successfully darting under, but many intercepting it squarely.

This plan is fine for native hunters in quest of fresh meat, but cruelly unsuited to a bird-banding mission. We'd have caught twenty or thirty birds, certainly, but half of them—legs or necks fractured—flapping great mortal flaps on the water . . . No, that was definitely not for us. Already I'd come to suspect that these adolescent birds were too wild and too nearly grown to be caught by any humane means. In bringing my 1,000 bands to Inagua I had envisioned a rookery with nestlings small enough to make their capture easy and harmless. That period had long since passed. Also, at the time of the first break I had been within close-up view of the fleeing birds. I had looked well at those tall pink toothpicks; their fragility had struck at the heart of me.

Unaware of my thoughts, John was unrolling the cord and preparing for the advance on the herd, which cowered, restlessly trapped, a couple of hundred yards before us. I called him back and, opening my camera case, said we'd go closer to take some pictures, but to forget about the banding. As best I could I explained that to band ten or twenty birds would be of no value what-

ever; and, even if it were, the capture would involve mortal injury to a prohibitively large number of others. These birds were definitely too old. It would be like trying to brand a herd of nearly grown range cattle.

John gave me an uncomprehending look: here after strenuous herding we finally had got a thousand of the quarry nicely bottled up; we had these lovely shiny rings and a pair of pliers with which to apply them; certainly no man in his right mind would pass up this wonderful opportunity.

But I wasn't to be persuaded; we were going in closer with only a camera. Before long we were within a few hundred feet of the pink picket fence. There was no place the birds could go now without first push-



ing us out of their way, and this I hoped to avoid by a careful, limited approach. Some had already tried the mangrove, only to trip, fall and get their wings, legs and necks entangled in the arches. Closer and closer. Now I was within good range and had the camera to my eye. I hoped to take pictures fast, then retreat. But just as I snapped the shutter it happened. The dam broke.

They came at us like the front of a tidal wave—heads down, necks stretched out in front, wings beating wildly. Those horizontally held heads and necks resembled the downspear charge of an ancient army, and it was this more than anything else that put the fear of God into me. To be trampled underfoot by birds seems like a silly thing, hardly possessing any element of danger.

*Continued on Page 192*

# MYTH-INFORMATION

By Lewis Wayne Walker

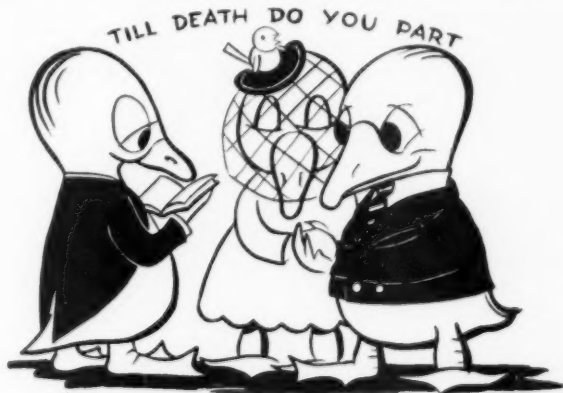
(Many wildlife myths and legends, built up by our early settlers around certain kinds of American birds and other animals, persist from generation to generation. In this series, a writer-naturalist tells the true stories underlying some pet beliefs.—The Editors)

Number 7 in a series

## Life Mates Among the Birds

A great number of people, perhaps even the majority, believe that geese mate for life and aver that if one of a pair is killed the other will lead the life of a widow or widower to the end of its days. As most geese nest in the far north, where observations are hampered, this tale will have to be broken by deductions unless we take captives as examples. If we do, then we can get ample proof from game breeders that they are not true to their mates even for the duration of a single season.

When we consider the tremendous number of geese killed each year by hunters, it is plain to see that there are numerous broken pairs. If each single bird were no longer to reproduce, the goose supply of the world would have been completely dissipated.



A similar life mating story is told of eagles, but experts agree that eagles are not true for life if death parts a pair. There are numerous cases of one bird of an aerie being killed with the nest being utilized the following year by a pair of birds, one of which was the bereaved one of the year before and the other a new mate. There seems to be no doubt, however, that if a pair of eagles is left undisturbed they will usually remain mated year after year.

# GASPÉ *Vacation*

*All photographs by the author*

The famous gannet cliffs of Bonaventure Island.





Fishing boats at Barachois, Province of Quebec.

By **Hustace H. Poor**

**T**HE fame of its gannet colonies lures many an ornithologist to the little town of Percé at the tip of the Gaspé Peninsula in eastern Canada. The end of June is the best time to visit the Gaspé, for the land bird song season is still in full swing and most of the resident species are nesting. However, the gannet colonies are active throughout June, July and August, and at any season the highway around the peninsula is beautiful, particularly along the north shore, where the steep coastline seems to tumble into the sea.



A gannet carries seaweed to its nesting cliff.

The finest view of all can be seen from the top of Mount Ste. Anne behind Percé looking down on the little village at the water's edge, on spectacular Percé Rock just off the beach, and on Bonaventure Island surrounded by the blue waters of the Gulf of St. Lawrence. Here is also an ideal spot from which to watch the sunrise, but at the end of June this comes early. The high latitude, the eastward stretch of the peninsula, and daylight saving time combine to make the sky light at 3 a.m.!

The mountainous terrain and the cold waters of the Atlantic on three sides give the Gaspé peninsula changeable weather. Be prepared for a day to change quickly from bright sun to rain squall and back again, and have a flexible schedule so that a day or two of fog will not prevent you from seeing a place you particularly wish to visit. Varied too is the physiography and ecology of the peninsula. The shoreline includes promontories rising abruptly out of the gulf, sheltered coves, mudflats and marshes. The hills are covered with white birches, contrasting sharply with the balsam firs whose erect cones set them apart from the spruces and hemlocks. The timber is second growth, for lumbering and fire have taken their inevitable toll. Back off the highways toward the interior big game may



be found—moose, caribou, deer and black bear. In the lakes and streams are trout and salmon to fill the creels of fishermen. Fields near the coast are white with daisies, or yellow with mustard or buttercups, set off by dark purple vetch. There are beds of beautiful wild iris, and the giant cow parsnip lifts its umbels four to six feet above the ground. Here savannah sparrows sound their grasshopper-like "tsik-tsik-tsik-tzececece-tsik," brilliant goldfinches sit on the fences, and bronzed grackles fly back and forth with food for their young. The robins are noticeably larger and darker than the ones in the States, for they are representatives of the "black-backed" Newfoundland subspecies. And ubiquitous starlings are in all the villages.

The highlight of a Gaspé trip is the two hour boat ride around Bonaventure Island, famed for its sea bird colonies (cost, \$1.25). Be sure you go with Captain Willie Duval, for he is custodian of the sanctuary and knows the birds, while most boatmen taking parties around the island do not. As the boat leaves the shore and nears Percé Rock (so named because it is pierced by a large opening) you will see double-crested cormorants and herring gulls at their nests atop this unscalable monolith. Black guillemots ("sea pigeons"), jet black with large white wing patches and bright red feet, fly off or dive as the boat nears them. In the vicinity of Bonaventure Island they are joined by murres and razor-billed auks. All three species nest on the ledges along the face of the island. Puffins and Leach's petrels nest on Bonaventure, but are seldom seen, since they stay in their burrows by day. A small group of kittiwakes, whose black wing tips lack the white mirrors of most gulls, makes their home here.

The famous gannet colony, fourth largest of the 22 known breeding colonies in North America and Europe, lines the precipitous east side of the island. Approximately 20,000 gannets nest here, whitening the cliffs and crowding each other for space on the

Where sunlight penetrates the forest crown, bunchberry carpets the ground.



ledges. They fish far out in the gulf, but there are always great numbers at the cliffs during the breeding season, building their seaweed nests, incubating, shielding the young ones from the bright sun or the cold fog, or resting on the water, from which they arise ponderously as the boat bears down upon them. During their migration we see gannets far offshore sending up sprays of water as they plunge into the sea to catch their fish; at Bonaventure Island they are close by, their black primary feathers contrasting sharply with the snow-white plumage which suffuses into cream on the head and neck.

No ornithologist should fail to spend some time on the island itself. Captain Duval will be glad to land you in the morning and pick you up in the afternoon or the next day if you prefer to spend the night at the lodge which provides both sleeping accommodations and food. A wooded trail across the island leads to the top of the cliffs, where you may observe the gannets at leisure and at close range as they sit upon their nests or fly by a few yards away. They are fearless and protest only to the extent of striking if about to be touched; otherwise they pursue their domestic activities oblivious to human companions. The photographic possibilities are irresistible; estimate how much film you can possibly use and take three times as much.

Bonaventure Island has many northern forms of land birds and plant life to intrigue the naturalist. Black-poll and Tennessee warblers are common nesting species, singing loudly and regularly in the conifers. Flocks of red crossbills fly overhead, and the rising, buzzing note of the pine siskin will lead you to that species. Where sufficient sunlight can penetrate the forest crown the ground is carpeted with the showy dwarf dogwood, or bunchberry, whose symmetrical white bracts surround heads of inconspicuous flowers which in midsummer develop into clusters of bright red berries. Shinleaf, starflower, wild lily of the valley, and the delicate two-blossomed twinflower are typical of the flower-

ing plants that arise from the dead leaves of the forest floor, which they share with other types of plants such as ferns, club mosses and mushrooms.

Each year the road around the peninsula is improved, and more tourists come. Each year the mining developments in the interior grow larger, and the commercialization of the area creeps forward. Each year the picturesque folkways of the natives are diluted just a bit more by civilization, and some of the charm seeps away. So plan your Gaspé trip for the first opportunity—and allow enough time to travel slowly so as to absorb the peaceful atmosphere of this delightful region.

The white flowers of wild lily-of-the-valley arise from the dead leaves of the forest floor.



[[ In this and succeeding issues we bring you a test  
of your ability to identify birds from photographs. ]]

# PHOTO

## Quiz

By Hugo H. Schroder

*All photographs by the author.*

The author, a well-known bird photographer, asks about each picture, "What bird is it?"

A bird that nests along the Atlantic Coast and up the Missouri and Mississippi river systems. One of the smallest members of its family.





↑  
A black and white bird that seems to fly on "the tips of its wings," often seen perched in roadside apple trees and on fences and wires.

FOR ANSWERS TO PHOTO QUIZ  
SEE PAGE 204

→  
A grayish, hen-like bird of the salt marshes. Its "guinea-hen" call, *kek-kek-kek-kek*, and white patch under its short tail help to identify it.





# GUIDE

to Recreation and Exploration in the  
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## WILDLIFE IN A CHEMICAL WORLD

*Continued from Page 149*

typical DDT poisoning symptoms were found on the day following spraying. Census counts on a central 30-acre plot in the treated area were compared before and after spraying with counts in a similar untreated check area. A rapid decline in populations occurred in the DDT unit and one species, the Maryland yellow-throat, decreased by 63 per cent in the first 24 hours; another, the prairie warbler, was reduced by 93 per cent two days after spraying. At the completion of the study the three commonest songbirds in the area were down in numbers by 80 per cent.

In other experiments where high dosages of DDT were applied during the nesting season the bird kill has been consistently heavy. Furthermore, the species of birds affected bear relationship to the method by which the insecticide is applied. With aerial applications, those types of songbirds normally inhabiting the forest canopy are most seriously depleted, but when the toxicant is applied by means of ground equipment, it is the ground-feeding forms that suffer most seriously.

(To be continued in the July-August issue.)

• • •

## ABOUT EDWIN WAY TEALE

*Continued from Page 154*

Beyond that he is six feet tall, roughly 200 pounds in weight, has a delightful and helpful wife who shares his interest in natural history and lives in Baldwin, Long Island, halfway between the marts of Manhattan and some of the best shorebird haunts of the Atlantic Coast.

To one who has been many times afield with Edwin Way Teale, his outstanding qualities are physical energy, intellectual integrity and a never-failing enthusiasm in the pursuit and enjoyment of knowledge of nature. He tops it all off with a rollicking sense of humor that not even the worst weather or the worst luck can keep in subjection. Of the success that has come to him, all who know him can say with sincerity: "It couldn't have happened to a nicer fellow."

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"At the beginning of the current (1952) season, a new model, BALscope Sr., was made available for this project. As good as the older instrument was/is, this new one transcends anything the writer would have believed possible in such a glass.

"The clarity of vision is startling; the definition razor-sharp; the ease of focussing and interchange of eyepieces extraordinary. A far distant dark dot on a dead tree across the prairie suddenly becomes a Caracara; a tiny object far out on the lake marsh resolves itself into a Glossy Ibis, and that little lump on a fence post away down the sandy road, leaps into being as a Burrowing Owl!

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*Alex Sprunt Jr.*

National Audubon Society,  
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### JEAN DELACOUR

International Bird  
Protectionist  
and Museum Director

## Says



A lifetime of bird study and writing has made me very conscious of how much migration data, changing abundance and habits of our native birds never gets into print. Valuable day to day observations by thousands of amateurs are thus lost to science. *Audubon Field Notes*, with its comprehensive coverage of the entire country under a series of Regional Editors, at last offers a real solution.

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Sincerely yours,

JEAN DELACOUR

## Audubon Field Notes

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### FLAMINGO HUNT—Continued from Page 182

But these thousand wild creatures were nearly as tall as I and as dense as a solid wall.

John was about twenty feet to my left. I hastily glanced at him for a cue as to what to do. But just at that instant the tide hit us, obliterating John from sight. We were stones now on the shores of a raging pink sea. Suddenly my world was one of wings beating down and across my head and face, flamingo eyes and mouths inches from my own, necks spearing past. The first impact knocked me over, and I was knees-down on the ten-inch-deep bottom. Reflexively I turned my back on the stream and crouched with my head low. On and on they came, their webbed wet feet stamping up over my back, water from those alongside splashing up into my face. Out of the corner of my eye I could see only a speeding forest of bamboo.

The feeling swept over me that this could not be reality. It was so wholly removed from any other experience of my lifetime that for a moment I suspected my senses of deceit. Its duration was a year ten seconds long. Then it was over. I raised my head and saw the rear end of the herd tearing away in front of me. There was no lessening in speed until they were all across the bay and back into the primary lake.

Only then did I remember John and turn to where he had last stood. He was still there and most remarkably so. He too had stooped and turned his back to the flood. But, instead of being mentally stunned as I had been, he had worked. As the birds swept by he had reached and plucked one after another by its neck or its legs or even its wings. Now he stood there with a grin on his face and with nine flamingos somehow stuck to him. He held the necks of three in each hand, had another couple tucked under his arms, was holding one between his legs. They were quiet, beaten, subdued by his grasp.

I had managed somehow to keep my camera above water during the charge, and the first thing I can remember doing was snapping John's picture. Then I walked over.

Several of the birds whose necks he was gripping in his big strong hands seemed limp and dead. I repeated that there'd be no banding, and why not release his catch? He saw I was serious and dropped the load. Six of the nine immediately galloped off. Three slumped into the water, stunned or half choked. I picked their heads up and held them above the surface. They were still breathing and would recover.

John stood awkwardly by. His fine banding plan had been vetoed, and he was still wondering why. On an impulse I told him to untie his necklace and remove three bands. Then I reached into my wet pocket and handed him the pliers. I lifted the leg of one of the flamingos and held it above the water. John's gloom evaporated. He quickly pliered open one of the aluminum rings. Then with the uncertain sureness of a bridegroom he placed the metal on the

finger-like flamingo leg and bent it back into circular shape. We did this to all three birds, which soon revived, stood up and loped away in the direction of the main flock. With each lode we could see the sparkle of something shiny.

Three banded birds can have no scientific significance. But, should you ever run across a flamingo wearing a serial-numbered ankle bracelet, I'd certainly like to know.

#### NATURE IN THE NEWS—Continued from Page 163

the sun gleams from his little blue coat, and now and then he leans over and picks at his brown vest. The leaves fly up from the ground, a tempest of leaves, as the thrasher searches for his food. And the woodpecker, clamped against the trunk, digs into the maple tree, his head a red blur as he hammers.

Before long, it's fall and the black and white bobolinks by the hundreds sway on the stems of the ripening oats. The quail whistle in the fields and the doves mourn at evening. Before long, too, it is winter and the juncos, like little gray nuns, feed swiftly over the ground.

And all men wait for spring again and the little phoebe to come again, and all men are sorry they shot the birds when they were boys.

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## Audubon Guide To Bird Attracting



A house wren nesting in a *Lagenaria* gourd, one of the white-flowering kind. The hard-shelled gourds of the genus *Lagenaria* are most suitable for birdhouses. Photograph by Allan D. Cruickshank.

# Gourd Birdhouses

By Frances Houldson

THE use of gourds as birdhouses is not a new idea. Many years ago the Indians hollowed out gourds and hung them above their teepees to attract songbirds. These fruits lend themselves admirably to the purpose: their dark, round interiors form natural nesting sites for hole-dwelling birds. Even in these days of neatly built apartment houses for birds, a martin may pass up the apartment and move into a gourd!

It would be well worth your time and effort to plant a few hills of gourds, then, after curing them, to fashion them into long-lasting, attractive bird homes. Time and patience are a must, for it will be two years from planting until the houses are finally ready for occupancy! An obvious alternative to growing your own would be to purchase suitable specimens from florists or producers. But the choice specimens are highly sought after by fanciers and novelty manufacturers, so your own supply is desirable.

The gourds are a family closely allied to cucumbers and can be grown in any climate and soil adapted to the cucumbers, melons and squashes. In the South and West, plant gourds when all danger of frost has passed, and the ground is sufficiently warm. In the North it may be necessary to start the seeds indoors, and transplant the seedlings to open ground at the same time that other tender annuals are set out. Ample space, say about eight feet each way, should be allowed for the broad, rough leaves and long, trailing stems. However, odd corners of the garden may be used, for the large yellow flowers are both male and female on the same plant, so there is no need to have two plants together.

The plant grows rapidly, particularly if a shovelful of compost has been buried beneath the hill. Several seeds should be started in each hill but you should eventually thin out to only one or two vigorous plants to each hill, thus enabling them to produce large, select fruits. There are several varieties that will mature in the correct size range. Of these, Powder Horn, Calabash, Bottle Neck and Dipper are most



popular, and most easily obtained from seed houses.

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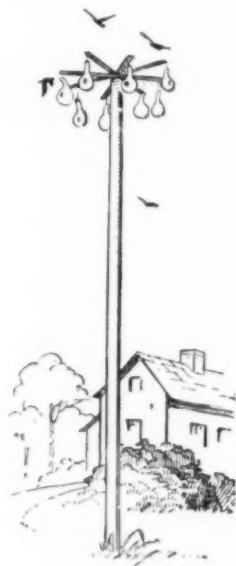
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sound-free from cracks and bruises. Do not pick until stem cracks; at that time they will be thoroughly ripened. Select a storage space that is warm and dry but well ventilated, and pack the gourds in crates that will allow air to circulate around all sides. The complete drying period will be about a year. Paint should not be applied until they are completely dry and hard, or it will certainly peel when exposed to the elements.

When at last you are ready to go to work on the gourds, give them a good soaking in water to prevent cracking, then open them carefully with a sharp knife, scoring the opening several times rather than plunging the blade in directly. Then remove the seeds and pith inside. Of course, you must first decide the size of



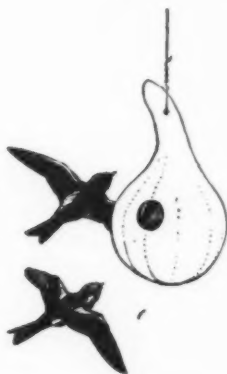
circle wanted, depending on what variety of bird is wanted as occupant, and whether the gourd itself is of correct size to house the desired species. An opening 1 inch in diameter is accessible to house wrens and chickadees, 1½ inches for bluebirds and swallows.\*

The final step is to scrape the outside of the gourd with the sharp knife until it is smooth and shining. After drying for the afternoon, a

\*See "Housing for Birds," Audubon Magazine, March-April 1950, page 122.



coat of clear shellac should be applied for weatherproofing. If you wish, you may obtain some oil colors at an art store, and finish the house in a solid color or design.



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—Aldo Leopold, "A Sand County Almanac."



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# Book Notes

By Monica de la Salle

**UP THE MISSOURI WITH AUDUBON:  
THE JOURNAL OF EDWARD HARRIS**

*Edited and annotated by John Francis McDermott, University of Oklahoma Press, Norman, 1951. 9¼ x 6¼ in., 222 pp. Indexed. Illustrated. \$3.75.*

In July 1824, Audubon, visiting Philadelphia in the hope of finding aid for the publication of his "Birds of America," made the acquaintance of "quiet, sedate, prosperous [twenty-five year old] Edward Harris, gentleman farmer of Moorestown, New Jersey." A few days later, he wrote: "Young Harris, God bless him, looked at the drawings I had for sale, and said he would take them *all*, at my prices. I would have kissed him, but that is not the custom in this icy city." This was the beginning of a life-long friendship. Nineteen years later, after a first ornithological excursion together in Louisiana, Harris was instrumental in making possible Audubon's Missouri expedition and accompanied him. "An interested traveler, a well-informed bird specialist, a scientific agriculturist, a careful business man," Harris left a journal of the six months' voyage now published for the first time in its entirety. It is a highly readable narrative, recording descriptions of the fauna seen along the way, of Indians, buffalo hunts, and details of travel and living in the West. Surprisingly enough, he remarks that the whole party was "disappointed in not finding this country to abound with Rattlesnakes as we were told it did." However, observations of birds, mammals, botany and geology no doubt made up for this frustration. The food at times was such that "he let it pass . . . rather than risk a rebellion from that important member of the body corporate, the Stomach." So it is not strange that he lost nearly 25 pounds after a few weeks, and found himself "weak and unable to endure the fatigue that [he could] at the commencement of the expedition." Not so Audubon, apparently, who busily explored the countryside in search of new species, going so



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#### PHEASANTS OF THE WORLD

By Jean Delacour, Charles Scribner's Sons, New York, 1951. 11¼ x 8¾ in., 347 pp. Illustrated by J. C. Harrison. Indexed. \$35.00.

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#### THE COMMON LOON IN MINNESOTA

By Sigurd T. Olson and William H. Marshall, Minnesota Museum of Natural History, Occasional Papers #5, University of Minnesota Press, Minneapolis, 1952. 9 x 6 in., 77 pp. Paper.

The thesis on which this booklet is based was the result of a two year study in the Quetico-

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### THE WHITE LADY

By Leonard Dubkin, G. P. Putnam's Sons, New York, 1952. 8¼ x 5½ in., 165 pp. \$3.00.

It was Mr. Dubkin's good fortune to accidentally discover a colony of little brown bats in an empty Chicago lot. When he witnessed the birth of a rare albino, this opportunity allowed him to follow her growth and development. Some details of the narrative seem a little difficult to believe, such as when the "White Lady" flies through an electric fan. Nevertheless, many questions remain unanswered regarding the habits and behavior of bats, so once again the observations of an amateur naturalist are a real contribution to science.



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The claws of America's national emblem, the bald eagle, will no longer bring two dollars a pair to Alaska bounty seekers, the National Audubon Society reported early in May.

The Society stated that a long campaign by Audubon groups and other conservation organizations has culminated in a federal regulation forbidding the killing of Alaskan bald eagles, unless they are found "committing damage" to wildlife or domestic stock.

The eagle bounty law in Alaska, which has caused bounties to be paid on more than 100,

000 eagles since its enactment in 1917, will be nullified by the federal regulation issued by Secretary of the Interior Oscar L. Chapman, the National Audubon Society believes. Provision that no part of the carcass of a bald eagle may be "possessed or transported for any purpose" will make it illegal to collect bounties on birds that may be destroyed under the terms of the regulation.

The National Audubon Society commended Secretary Chapman for his "wise and much-needed action," and expressed the belief that the majority of Alaskans will also approve.

### ANSWERS TO PHOTO QUIZ

1. Least tern.
2. Kingbird.
3. Clapper rail.

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